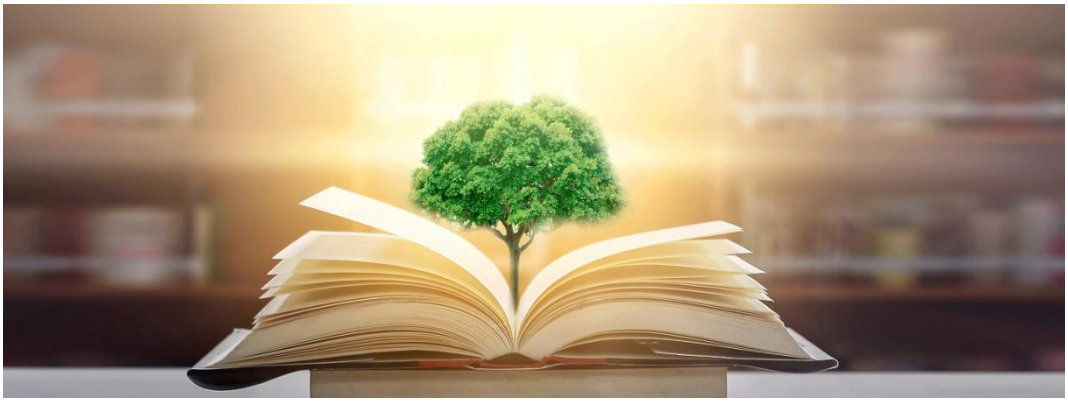
A PRACTICAL MANUAL

ON

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT



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FOREWORD

Environment studies is a multi-disciplinary science which deals with chemistry, physics, medical science, life science, agriculture, public health, sanitary engineering. Environment literally means surrounding external conditions influencing development or growth of people, animal or plants; living or working conditions. It is one of the basic and fundamental units of science. One cannot ignore the importance of environmental science and environmental studies. This subject deals the importance of protection and conservation of our environment. Presently, the environmental issues are becoming a menace to the mankind as well as other living organism in the earth.

I am well confident that practical manual will leave a useful document for the students to develop practical understanding about the various factors and chemicals causing harm to environment

Anupam Mishra

PREFACE

Environment According to Boring Langfield & Weld 'A person's environment consists of the sum total of the stimulation which he receives from his conception until his death'.

Environment is the sum total of all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturation of living organisms. The United Nations Conference on Environment and Development held in Rio de Janerio in 1992 and world Summit on Sustainable Development at Johannesburg in 2002 have drawn the attention of people around the globe to the deteriorating condition of our environment. Climate change which was predicted long time ago is happening now globally it is an issue for all.

It is essential to make the public aware of the formidable consequences of the Environmental Degradation, if not countered today, extinction of life is sure from the earth.

This manual will make everyone acquainted with these challenges so that their performances are eco- friendly. This manual will help

This manual has been prepared for the 1st Year 2nd Semester students of B.Sc. (Hons) Horticulture according to the recommendation of Fifth Deans Committee Report. The manual is an outcome of information compiled from various sources, therefore, I must express my most humble and profound gratitude to all of them. I am grateful to the College of Horticulture, Bermiok and Central Agricultural University, Imphal for providing the opportunity

The authors

CONTENT

Exercise 01: Visit to a local area to document Environmental assets-River

- ✓ Students have to visit the nearby rivers
- ✓ Take clear picture of the river ecosystem
- ✓ Carry sample container, water nets, dairy, gloves, hand lens etc.
- ✓ Documents the flora and fauna observe in the river ecosystem
- ✓ Note down the number of samples collected and record the observations

Sample 1	
Sample 2	
Sample 3	
Sample 4	
Sample 5	
Sample 6	
Sample 7	
Sample 8	
Sample 9	
Sample 10	

Discussion

Exercise 02: Visit to a local area to document Environmental assets-Forest

- ✓ Students have to visit the nearby forest
- ✓ Take clear picture of the components of forest ecosystem
- ✓ Carry sample container, water nets, dairy, gloves, hand lens etc.
- ✓ Documents the flora and fauna observe in the ecosystem
- ✓ Note down the number of samples collected and record the observations
- ✓ What type of forest ecosystem is found in the locality

Sample 1	
Sample 2	
Sample 3	
Sample 4	
Sample 5	
Sample 6	
Sample 7	
Sample 8	
Sample 9	
Sample 10	

Discussion

Exercise 03: Visit to a local area to document Environmental assets- Grassland

- ✓ Students have to visit the nearby Grassland ecosystem
- ✓ Take clear picture of the components of Grassland ecosystem
- ✓ Carry sample container, water nets, dairy, gloves, hand lens etc.
- ✓ Documents the flora and fauna observe in the ecosystem
- ✓ Note down the number of samples collected and record the observations
- ✓ What type of forest ecosystem is found in the locality

Sample 1	
Sample 2	
Sample 3	
Sample 4	
Sample 5	
Sample 6	
Sample 7	
Sample 8	
Sample 9	
Sample 10	

Discussion

Exercise 04: Visit to a local polluted Urban site

- ✓ Students have to visit the local urban areas and find out the types of pollution prevailing at the site.
- ✓ Take clear picture of the polluted site.
- ✓ Find out the cause of pollution at the site and materials found there.
- ✓ Analyse the situation and severity.
- ✓ Find out the problems face by the people living near the polluted site.
- ✓ Come up with possible solutions to limit it.

Exercise 05: Visit to a local polluted Rural site

- ✓ Students have to visit the local rural areas and find out the types of pollution prevailing at the site.
- ✓ Take clear picture of the polluted site.
- ✓ Find out the cause of pollution at the site and materials found there.
- ✓ Analyse the situation and severity.
- ✓ Find out the problems face by the people living near the polluted site.
- ✓ Come up with possible solutions to limit it.

Exercise 06: Pollution- case study 1

Material: Students will be provided resource sheet.

- ✓ Form groups among the students.
- ✓ Read the resource/material for 30 minutes.
- ✓ Summarize and report on the evidence.
- ✓ Discuss the ways in which other tragedies can be prevented.

Exercise 07: Visit to a local polluted Industrial Site

- ✓ Students have to visit the local Industrial site and find out the types of pollution prevailing at the site.
- ✓ Take clear picture of the polluted site.
- ✓ Find out the cause of pollution at the site and materials found there.
- ✓ Analyse the situation and severity.
- ✓ Find out the problems face by the people living near the polluted site.
- ✓ Come up with possible solutions to limit it.

Exercise 08: Pollution- case study 2

Material: Students will be provided resource sheet.

- ✓ Form groups among the students.
- ✓ Read the resource/material for 30 minutes.
- ✓ Summarize and report on the evidence.
- ✓ Discuss the ways in which other tragedies can be prevented.

Exercise 09: Visit to a local polluted Agricultural Site

- ✓ Students have to visit the polluted Agricultural site and find out the types of pollution prevailing at the site.
- ✓ Take clear picture of the polluted site.
- ✓ Find out the cause of pollution at the site and materials found there.
- ✓ Analyse the situation and severity.
- ✓ Find out the problems face by the farmers.
- ✓ Come up with possible solutions to limit it.

Exercise 10: Pollution- case study 3

Material: Students will be provided resource sheet.

- ✓ Form groups among the students.
- ✓ Read the resource/material for 30 minutes.
- ✓ Summarize and report on the evidence.
- ✓ Discuss the ways in which other tragedies can be prevented.

Exercise 11: Study of Common Plants, Insects and Birds

Material requires: Hand lens, Sample container, envelop, knife, scissors, Paper bags, note book, pen, marker, label tags, camera

1. To study the common plants in the campus

Tag. No.	Common Name	Scientific name	Family	Habitat	Identifying character

Observation site/ location of the plant to be specified by giving specific numbers to the plant and mention the tag number.

2. To study the common insects in the campus

Sl. No.	Common Name	Scientific name	Family: Order	Pest/ Beneficial	Identifying character

2. To study the common birds in the campus

List down the common birds in the campus

Role of the birds

Exercise 12: Study of Solid Waste Management

Solid waste means any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations.

Solid waste management

Solid waste management is usually referred to the process of collecting, treating and disposing of solid wastes. It provides solutions for recycling items that do not belong to garbage or trash. Solid waste management can be described as how solid waste can be changed and used as a valuable resource. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn lead to pollution of the environment. Diseases can be spread by rodents and insects. The tasks of solid waste disposal management are complex technical challenges. They can also pose a wide variety of economic, administrative and social problems that must be changed and solved.

Methods of Solid Waste Disposal and Management:

1) Solid Waste Open Burning
2) Sea dumping process
3) Solid wastes sanitary landfills
4) Incineration method
5) Composting process
6) Disposal by Ploughing into the fields
7) Disposal by hog feeding
8) Salvaging procedure
9) Fermentation/biological digestion.

Compost

It refers to the materials collected on the farm (or) town (or) village and allowed to decompose for a desirable period of time so as to get well decomposed materials.

Composting

It is a process of reducing the vegetative and animal refuses to a quickly utilizable condition for improving and maintaining soil fertility. It is largely a biochemical process in which microorganisms of aerobic and anaerobic are involved. Some composting methods are given below-

i. Activated compost process

This process was introduced by Flower and Redge in 1922 at Indian Institute of Science, Bangalore. They used night soil, dung, urine, sewage and activated sludge as starter ie., the materials used for decomposing plant residues. The starter contains vigorous microflora which helps in decomposition.

Advantages

- Manures are prepared from town waste and sewage
- Sludge and sewage are used as starter. Disadvantages
- Manures are prepared in big city by this method. So, this is not a popular method of composting in rural areas
- The manures prepared by this method contain various harmful organisms. The manure needs to be applied after sterilizing with some chemicals (eg. Chlorine, bleaching powder).

ii. Indore process

This process was devised by Howard and Ward at the Indian Institute of Plant Industry, Indore. The cow dung in small amounts is used as starter. It is an anaerobic process and decomposition takes place in anaerobic condition. The composting is preferably carried out in the trenches of 30 feet long and 14 feet breadth and 2 feet deep. The farm wastes are spread on the trenches and cow dung is added on each layer. When the trench is filled to a height of 1 feet above the ground level, the top of the head is made as dome shaped and plastered with cow dung mixed with soil. The turning of the heap is done at two weeks, four weeks and eight weeks for well decomposition. The manure becomes ready after three months. The manure produced by this method contains 1% N, 0.5% P_2O_5 and 3% K_2O.

iii. Bangalore Process

The process was devised by C.N. Acharya, as a result of his experiment at the Indian Institute of Science, Bangalore. First, a layer of refuse about 9 to 10 inches (22.5 to 25 cm) thick is spread at the bottom of the trench and over this calculated quantity of night soil is added corresponding to a thickness of 3 inches. Each layer of night soil should be immediately covered with refuse to about 9 inches thick. If the loose earth is available, it is a good practice to cover the top of heap at the end of each working day with a thin layer of earth about ½ to 1 inch thick. This effectively prevents fly breeding and avoids smell nuisance altogether. The mixed vegetable refuges should be put in trenches of suitable size. The whole length of the trench should be covered at the bottom with a layer of 6 inches (15 cm) thick of vegetable refuse and this should be moistened with 20 to 30 gallons of water. Over this a thin layer of 2 inches (5 cm) of farmyard manure is placed (or) mixed refuse or litter and dung, and urine mixed earth brought from the cattle shed. This is again covered on the top with a layer of earth to one-inch thickness. The manure would be ready in about 8-9 months' time if left undisturbed.

Advantages

- This method effectively controls foul smell.
- This method does not need turning and therefore saving of cost.
- Trenches are used for composting and it reduces the loss of moisture and nitrogen.
- This method minimizes the fly nuisance by destroying fly larvae and also kills the pathogenic organism.
- Compost is prepared from town waste. So, the cost of manure is less.
- Compost prepared by this method contains more amount of N. So, it is a good organic manure. It is a suitable manure for vegetable cultivation in urban areas.

Disadvantages

- Disease causing organism remains in the manures. So, it should be sterilized before application in the field.
- Night soils are used as catalyst. So, most of the farmers do not want to use this manure.

iv. Coimbatore method

In Coimbatore method, composting is done in pits of different sizes depending on the waste material available. A layer of waste materials is first laid in the pit. It is moistened with a suspension of 5-10 kg cow dung in 2.5 to 5.0 I of water and 0.5 to 1.0 kg fine bone meal sprinkled over it uniformly. Similar layers are laid one over the other till the material rises 0.75m above the ground level. It is finally plastered with wet mud and left undisturbed for 8 to 10 weeks. Plaster is then removed, material moistened with water, given a turning and made into a rectangular heap under a shade. It is left undisturbed till its use.

Vermicomposting

Vermicomposting is defined as a biological process through which organic wastes are converted into manure by the action of earthworm. Materials required Earthworms, cowdung, soil and other organic wastes.

Procedure

- Select a leveled ground in a shady place and spread soils uniformly over the ground as a bed with size of 90cm width, 30cm height and convenient length depending upon the availability of waste.
- Spread small pebbles (or) coir wastes to a thickness of 5cm and partially decomposed cow dung to a thickness of 30 cm and organic wastes materials and moisten this layer.
- Release the earthworm above this layer.

- Maintain the moisture condition to 40 to 50 per cent and allow it to stand for 45 to 60 days. Remove the superficial layer alone and dry it in the shade. It is called as vermicompost

To Do Work

1. What is composting?

2. What do you understand about compost?

3. What are the types of composting?

4. If you are given any raw material what would be your idea for composting?

Exercise 13: Study of Human Population and the Environment

- **Visit to highly populated human locality and least populated locality**

- **Discuss the differences you observed in both the locality in terms of pollution**

What would you like to conclude by observing both the places and mention few suggestions.