ENVIRONMENTAL SCIENCE

Course Code : 18 CE M01

UNIT - 5
SOCIAL ISSUES AND THE ENVIRONMENT

Smt. Manasa Kotha
Assistant Professor
Department of Civil Engineering
CBIT (A)

CONTENTS

- Water conservation methods: Rain water harvesting and watershed management
- Environmental ethics
- Sustainable development and Climate change: Global warming, Ozone layer depletion, forest fires, and Contemporary issues.

WATER CONSERVATION MEASURES:

WATERSHED MANAGEMENT AND RAIN WATER HARVESTING

Smt. Manasa Kotha Asst. Professor
CED

WATER- “ The Source of Life”

Water has become a highly precious resource. There are some places where a barrel of water costs more than a barrel of oil.

-

WHAT IS WATERSHED

•A watershed is a basin like landform defined by peaks which are connected by ridges that descend into lower elevations and small valley

•It carries rainwater falling on it drop by drop and channels it into soil rivulets and streams flowing into large rivers and in due course sea.

•It affects the people living downstream

•It is a synonym of catchment or

basin of a river coined for an area restricted to 2000sq. Km.

- All characteristics affect the disposal of water.
- **SIZE:** It helps in computing parameters like precipitation received, retained, drained off.
- **SHAPE:** Different shapes based on morphological parameters like geology and structure, eg. pear, elongated etc.
- **PHYSIOGRAPHY:** Lands altitude and physical disposition.
- **SLOPE:** It controls the rainfall distribution and movement:
- **CLIMATE:** It decides the quantitative approach.
- **DRAINAGE:** It determines the flow characteristics and so the erosion behavior.

CHARACTERISTICS OF WATERSHEDS

- **VEGETATION: Information of species gives a sure ground for selection plants and crops.**

- **GEOLOGY AND SOILS: Their nature determines size, shape, physiographic, drainage and groundwater conditions. Soils, derivative of rocks are the basic to greenery**

- **HYDROLOGY: Basic to final goal of growing greenery in a watershed. It helps in quantification of water available.**

- **HYDROGEOLOGY: Availability of groundwater.**

- **SOCIOECONOMICS: Statistics on people and their health, hygiene, wants and wishes are important in managing water.**

WATERSHEDSHED MANAGEMENT

- **It involves management of land, water, energy and greenery integrating all the relevant approaches appropriate to socioeconomic background for a pragmatic development of a watershed**
- **Greening of the watershed through proper management of land water and energy resource.**

The objectives of watershed management

- Conserving soil and water
- Improving the ability of land to hold water
- Rainwater harvesting and recharging
- Growing greenery – trees, crops and grasses

Soil conservation techniques

- Contour
- Gully control
- Reclamation of alkaline soil
- Green carpeting

contour

gully

Green carpeting

RAINWATER HARVESTING

- Capturing runoff from rooftops
- Capturing runoff from local catchments
- Capturing seasonal floodwaters from local streams
- Conserving water through watershed management

Components of rainwater harvesting

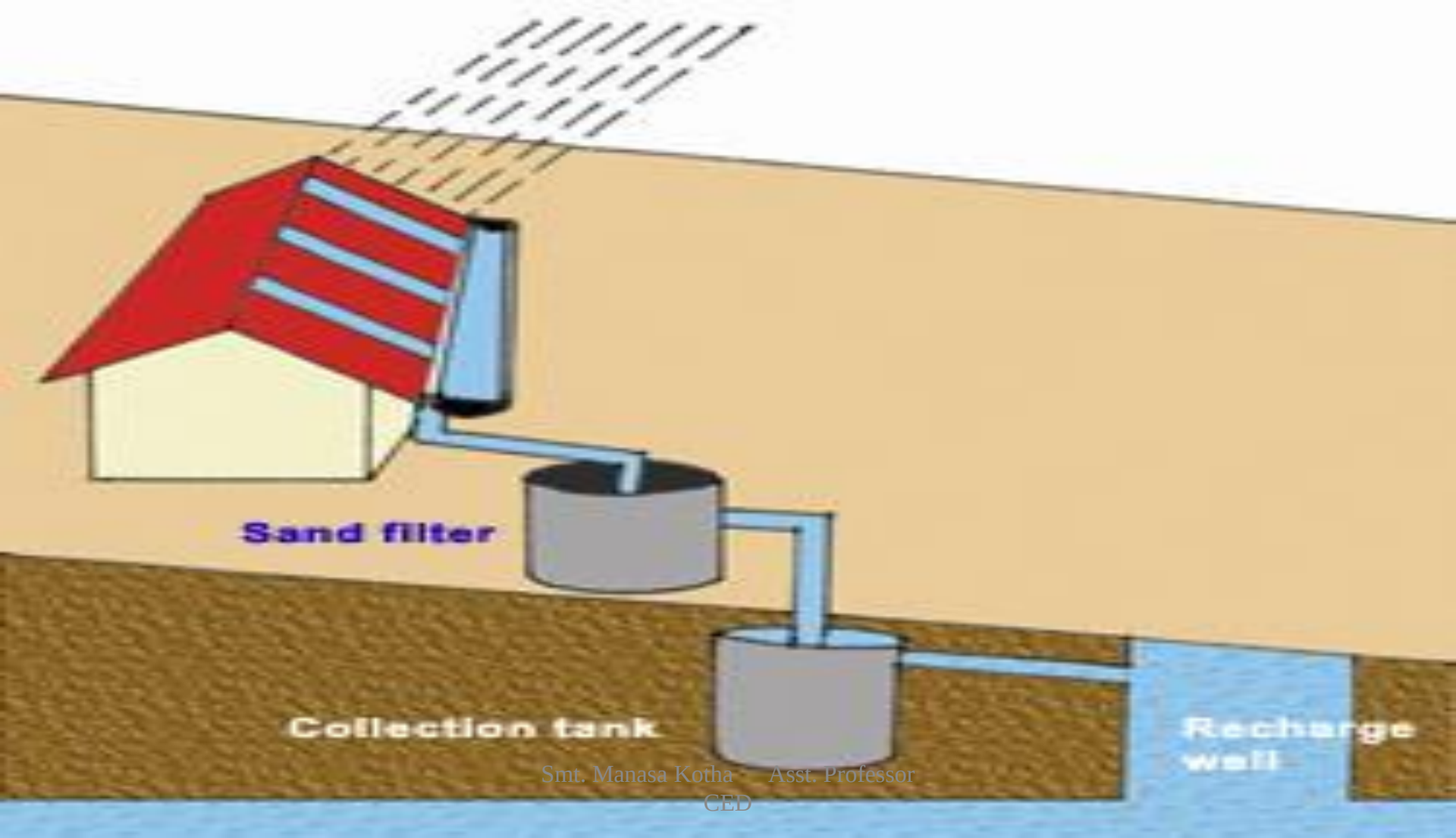
- Catchments
- Coarse mesh
- Conduits
- Storage facility

Rainwater harvesting in a house

Rain water harvesting in a village

Rain water recharging

Rainwater harvesting through recharge well



These techniques can serve the following purposes:

- Provide drinking water
- Provide irrigation water
- Increase groundwater recharge
- Reduce storm water discharges, urban floods and overloading of sewage treatment plants
- Reduce seawater ingress in coastal areas.

How much water can be harvested?

Urban scenario

Water harvesting potential = Rainfall (mm) x Collection efficiency

- Area of plot = 100 sq. m. (120 square yards)
- Height of the rainfall = 0.6 m (600 mm or 24 inches)
- Volume of rainfall over the plot = Area of plot x height of rainfall
- Assuming that only 60 per cent of the total rainfall is effectively harvested
- Volume of water harvested = 36,000 litres (60,000 litres x 0.6)

This volume is about twice the annual drinking water requirement of a 5-member family. The average daily drinking water requirement per person is 10 litres.

Rural scenario

- India's average rainfall is about 1170 mm.

- An average indian village needs 1.12 hectares of land to capture 6.57 million litres of water
- India's total land area is over 300 million hectares. Let us assume that India's 587,000 villages can harvest the runoff from 200 million hectares of land, excluding inaccessible forest areas, high mountains and other uninhabited terrains, that still gives every village on average access to 340 hectares or a rainfall endowment of 3.75 billion litres of water.
- These calculations show the potential of rainwater harvesting is enormous and undeniable.

GALLERY

Smt. Manasa Kotha Asst. Professor
CED

Afforestation

Water Resources Development and Management

Rural community mobilization

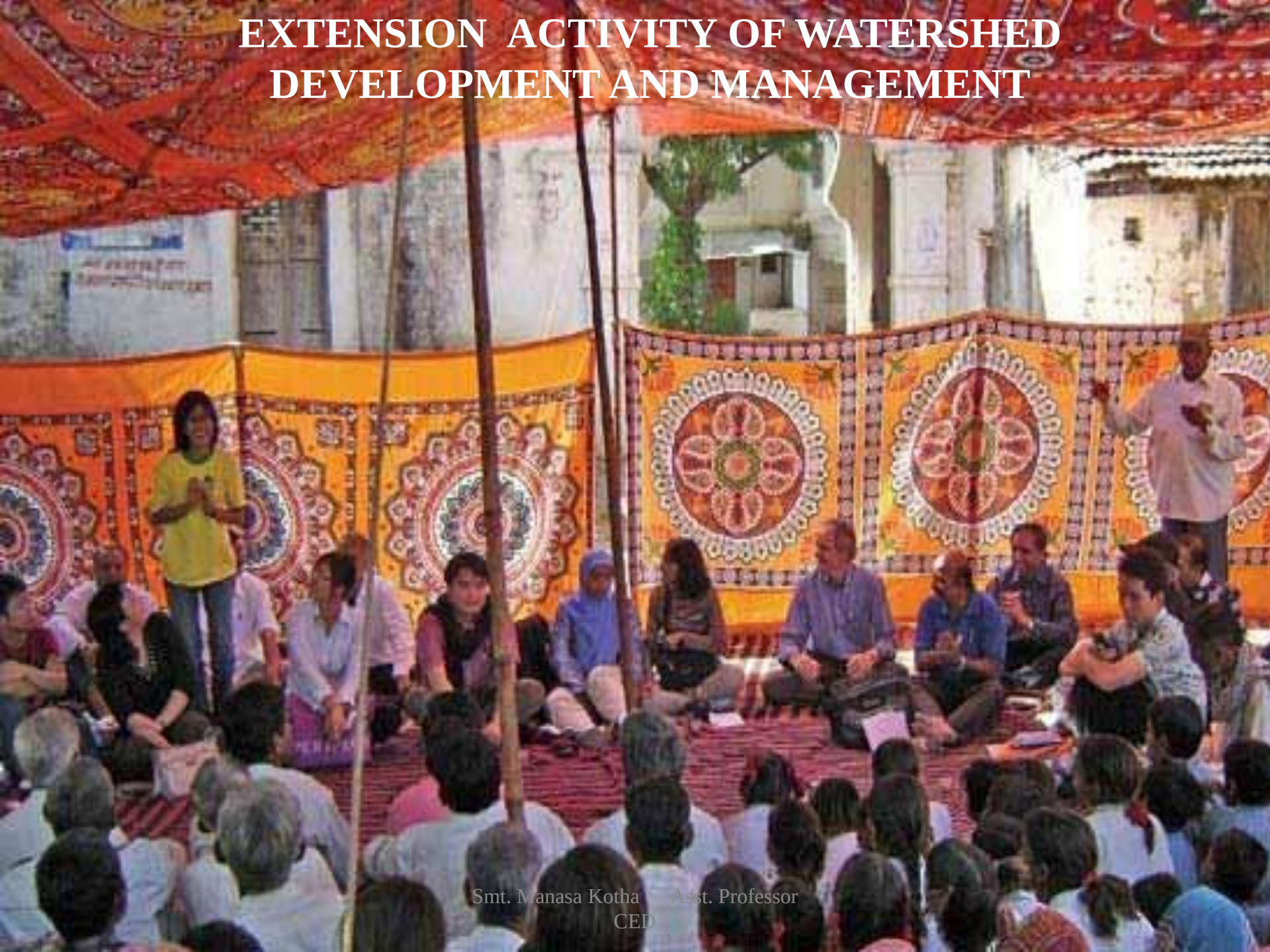
Smt. Manasa Kotha Asst. Professor
CED

WATER RESOURCE DEVELOPMENT

WATER RESOURCE DEVELOPMENT (CHECK DAMS)

Smt. Manasa Kotha Asst. Professor
CED

EXTENSION ACTIVITY OF WATERSHED DEVELOPMENT AND MANAGEMENT



Smt. Manasa Kotha Asst. Professor
CED

WORKING FOR BETTER RURAL LIVELIHOOD

Smt. Manasa Kotha Asst. Professor
CED

LOCALIZED WATER BODY DEVELOPMENT

Smt. Manasa Kotha Asst. Professor
CED

CHECK DAMS

Smt. Manasa Kotha , Asst. Professor
CED

Smt. Manasa Kotha , Asst. Professor
CED

Smt. Manasa Kotha Asst. Professor
CED

SOIL AND WATER CONSERVATION MEASURES

Smt. Manasa Kotha Asst. Professor
CED

PRECISION FARMING

Smt. Manasa Kotha – Asst. Professor
CED

LANDUSE DEVELOPMENT AN D MANAGEMENT

Smt. Manasa Kotha Asst. Professor
CED

ENVIRONMENTAL ETHICS

- It is a branch of philosophy that considers the moral relationships between humans and their natural environment
- It is a study of a Human's personal ethics and morals for the actions he does for or against his environment.
- Environmental Ethics deals with issues related with ethical decisions a Human makes with respect to his environment

..

- Some of the examples are below –
  - Should we need to cut forests for furniture ?
  - Does the present natural resources suffice the future generations ?
  - Switching off the lights when not in use
  - Swacch Bharath
  - Switching to renewable sources of energy

SUSTAINABLE DEVELOPMENT

- It is a phenomenon of improvement of quality of our daily environment by consuming the natural resources without compromising future generations
  - Example : Coal , Crude Oil, Forests, Mineral Resources
- In other words, it is simply defined as "**DEVELOPMENT WITHOUT DESTRUCTION**"
- Measures for Sustainable Development
  - POPULATION CONTROL
  - CONSERVATION OF BIODIVERSITY
  - EFFECTIVE RECYCLING OF WASTES

..

- LIMITED RESOURCE CONSUMPTION
- WATER RESOURCE MANAGEMENT
- INTEGRATED LAND USE MANAGEMENT
- AWARENESS PROGRAMS

- **THREATS TO SUSTAINABILITY**
  - Energy Depletion
  - Collapse of Climate System
  - Collapse of Ecology
  - Global Recession

POPULATION EXPLOSION

- Sudden increase in population is called Population Explosion
- Presently India is passing through this phase resulting in Rapid Growth of population ultimately leading to poverty and barring development.

CAUSES

- Illiteracy
- Poor Family Planning missions
- Increase in Agricultural and Industrial Productivity

IMPACTS

- Poverty
- Malnutrition
- Environmental Degradation
- Outburst of Uncontrollable Diseases
- Economic Inequality
- Over Exploitation of Natural Resources
- Sanitation problems

CLIMATE CHANGE

- GLOBAL WARMING
- ACID RAIN
- OZONE LAYER DEPLETION

GLOBAL WARMING

- The rise in global average temperatures on a yearly basis ultimately leading to melting of ICE caps at Arctic and Antarctic Regions rising the sea level and submerging the Peninsular and Island Nations threatening its natural environment.
- This phenomenon also affects the animals living in those ICE caps with forms its natural Biodiversity.

CAUSES

- Greenhouse Gases such as CO_2 , NO_2 , CH_4, O_3 ,etc emitted by Natural and Anthropogenic activities have a specific nature to absorb the heat which must be released back from the earth's atmosphere

Solutions to Global Warming

- Reducing the Emission of GHG's
- Incorporating Clean Energy Technologies
- Switching to Bio-Fuels
- Avoiding Driving Vehicles for smaller distances or switch to Solar vehicles, bicycles etc

ACID RAINS

- The Primary Air pollutants such as SO_x, NO_x, etc emitted through natural and artificial activities mix with naturally available water vapour in the atmosphere to form corresponding secondary pollutants like the suphuric and Nitric acid when precipitate in the form of Acid Rains

EFFECTS

- Deforestation
- Degradation of Soil Fertility
- Corrosion of Historic Sculptures
- Skin Diseases

OZONE LAYER DEPLETION

- The naturally available ozone gas which is present in the outermost stratosphere acts as a blanket which filters the Harmful UV rays from the sun
- This Ozone layer gets depleted by CFC's and HCFC's emitted by Household refrigerators, Air Conditioners etc forming holes in that layer thereby enabling the UV rays to enter the earth's atmosphere.

EFFECTS

- Eye cataracts
- Lowers Human Immunity
- Reducing the effective functioning of lungs
- Skin cancers
- Certain crops get affected pen ultimately affecting the food chain and ultimately affecting a healthy ecosystem