

# **Environmental Protection**

**1- General Aspects**

**2- Legal Aspects**

**3-Role of Government**

**4- Role of Non Governmental  
Organization (NGO)**

# General Aspects

# Water management

- **Water is precious natural resource. It is an essential commodity for maintaining the life, producing the agricultural products and for industrial development.**
- There are many strategy that are/can be adopted to conserve the water. Main among them are the following:
  - 1- **Careful measures in day-to-day life to save water**
  - 2- **Rain water harvesting**

# 1- Careful measures in day-to-day life to save water

## Domestic conservation:

- water leaked should not be allowed
- The continued flow of water should not be allowed during tooth brushing, shaving, washing etc.
- Avoid irrigation the garden in noon.
- Etc.

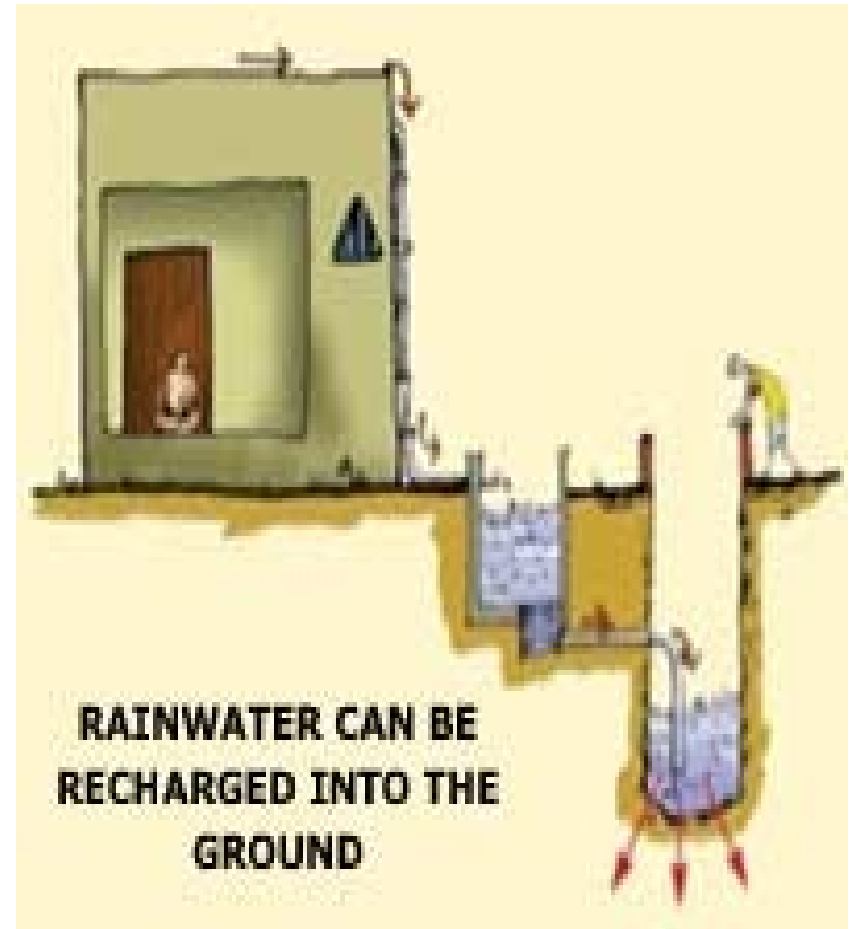
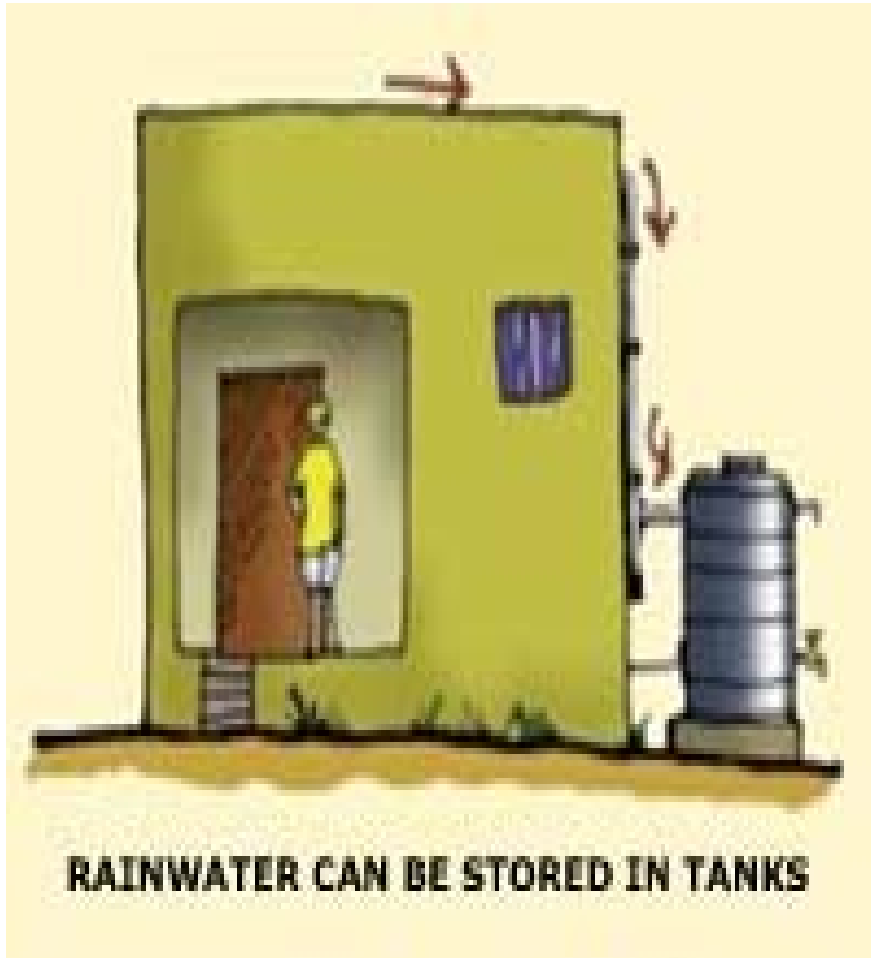
# Agricultural conservation

- **i) In semi-arid region and arid regions, the drought resistant crop that require less water, should be cultivated.**
- **ii) Mulch (artificial protective covering around the plants) should be used to retain water around the plants.**
- **iii) The canals should be efficiently lined on its sides and bottom to minimize the seepage; if possible, it should be covered to reduce the evaporation.**

# Industrial conservation

- i) By recycling the water again and again, in thermal power plants.
- ii) By using air cooling or mixed (air + water) cooling in cooling towers and condensers of the steam power plants.

## 2- Rain water harvesting





**ELEMENTS OF A TYPICAL WATER HARVESTING SYSTEM**



# RAIN WATER HARVESTING

Abhishek Swami and Kamal Kishore

**Water is an essential natural resource for sustaining life and environment. Massive deforestation, pollution and increasing population pressure on these natural resources has led to its depletion at an alarming rate.**

In India the water crisis in term of spread and severity affect one in every three person.

## Picture of Water Resource and Availability:

World water Resource	
Ocean	97.2 %
Polar and glacier	2.15 %
Under Ground water	
800 mt depth	0.31 %
Below 800 mt depth	0.31 %
Soil Moisture	0.005 %
Surface Water	
Lake	0.017 %
River and stream	0.001 %
Atmosphere	0.001 %

Fresh water which we have always thought to be available in abundance is very scarce in comparison to total water present on earth.

Globally on an annual basis for human use 12.5 to 14 billion cubic meter water is considered available:

Year	Per capita availability of water
1989	9000 Cu.mt./ Year
2000	7800 Cu.mt. / Year
2025	5100 Cu.mt. / Year

Even the amount of fresh water/capita would be enough to meet human needs, if it were properly distributed. But equitable distribution is not possible due to mainly two reasons:

## Water from rainfall

India receives on annually precipitation including snowfall and rain of around 4000 billion cubic meter.

Of this the run off accessible water is 1,869 billion cubic meter, of which barely 690 billion cubic meter is used. Nearly 1,179 billion cubic meter (roughly two rivers, the size of Brahmaputra) of water drains in to the sea, much of it in the rainy days of around 100 days.

Adding 432 billion cubic meter of ground water with 690 runoff accessible water, the total real available water in India is 1,122 billion cubic meter for the billion plus population of the country.

The technological mission for drinking water actively functioning 90's reported that if even 15 % of the monsoon rain is tapped for recharging the under ground aquifer, it will solve the drinking water problem in most of the state.

## What is rain water harvesting?

Rain water harvesting is the management of rain run off involving harvesting of excess rain falling on land surface by creating a storage facility either in a field or in a constructed structure.

Basic principle of rain water harvesting is to collect the rain water where it falls, use it, and let it seep into the ground. In other words the main purposes of rainwater harvesting are to:

- ❖ Storing water for direct use.
- ❖ Ground water recharging

## Type of rainwater harvesting

Three types of water harvesting are covered by rain water harvesting

(i) Water collected from roof tops, courtyards and similar compacted to treated surfaces is used for domestic purposes or garden crops, or for ground water

recharge.

(ii) Micro – catchment water harvesting is a method of collecting surface runoff from a small catchment area and storing it in the root zone of an adjacent infiltration basin. The basin is planted with trees, bushes or with annual crops.

(iii) Macro – catchment water harvesting, also called harvesting from external catchments, is the case where runoff from hill-slopes catchment is conveyed to the cropping area located at hill foot flat terrain.

### **Rainfall Pattern of India**

Rainfall in India is characterized by its diversity both the geographical division and season of the year. Add to this diversity in space and time there are large variations in each geographical region from one year to another, resulting in flood in some areas and droughts in other.

The annual average rainfall in India works out to about 1100 mm on an average, while it varies from as low as 250 mm to as high as 4000 mm. 80 % of annual rainfall in India occurs during south – west monsoon season from June – September. The dates of the onset of monsoon in different regions of the country as also distribution and intensity of the rainfall vary considerably year after year.

Only 20 % of the rain occurs due to north east monsoon during October – November months.

More than 50 % of the precipitation takes place in about 20 days and less than 100 hrs, altogether in a year. Rainfall occurring in such a short of high intensity tends to flow rapidly into the ocean.

Why rainwater harvesting is necessary?

- ❖ Due to increasing demand of water for different purposes.
- ❖ Due to decreased availability of fresh water resources.
- ❖ Because growing water needs of a growing population can only be met by the rain harvesting.
- ❖ To maintain the hydrological balance in Biosphere.
- ❖ Due to decreased level of under ground water

table because the annual recharging of water is much less than what is consumed.

- ❖ Because rainwater is the primary and purest form of water on earth.
- ❖ Due to excessive rain occurs within a very short spell of 100 days.
- ❖ Due to severely polluted rivers of India rain water is the main and cheap source of clean water.
- ❖ Rain water harvesting is necessary for agriculture point of view.
- ❖ Because 80 % of annual precipitation flows into the sea taking along with it 12000 tones of soil. This causes siltation, flood, infertility of soil and consequently resulting in economic loss because of low crop yield.
- ❖ Because by rain water harvesting we can minimize the severe flood and drought conditions. In India on an annual average 91 districts are drought affected while 40 million hectares in 83 districts is submerged in flood water.

### **Rain water harvesting through Roof Top**

Roof top rain water harvesting is very useful and time demanding method for urban areas because in urban areas due to rapid urbanization which includes construction of houses, buildings, roads and other structures, which minimize the open earth surface for natural recharging of ground water and so maximum rain water flows wastefully in urban water drawing channels.

- ❖ Water from roof top collects directly into underground tanks or in above ground tanks.
- ❖ Recharging ground water through existing wells, bore wells or by constructing new wells and bore wells.
- ❖ Collection of rain water from urban roof top and channelled it into cities ponds, tanks and lakes and prevent it from draining out.

**(The authors are from Department of Zoology and Environmental Sciences, Gurukula Kangri University, Haridwar)**

# Role of information Technology in Environment

- Information technology (IT) is a methodology of system that envisages **the reciprocation of information and instant communication form one place to another anywhere in the world.**
- The information may be related to **scientific researches, meteorological data, environmental predications or human health.**

## **1-Remote sensing information system (RSIS ):**

- With satellite communication
- This system is suitable for study of geographical, forestry, botanical, geological and meteorological information.

## **2- Computer based weather forecasting:**

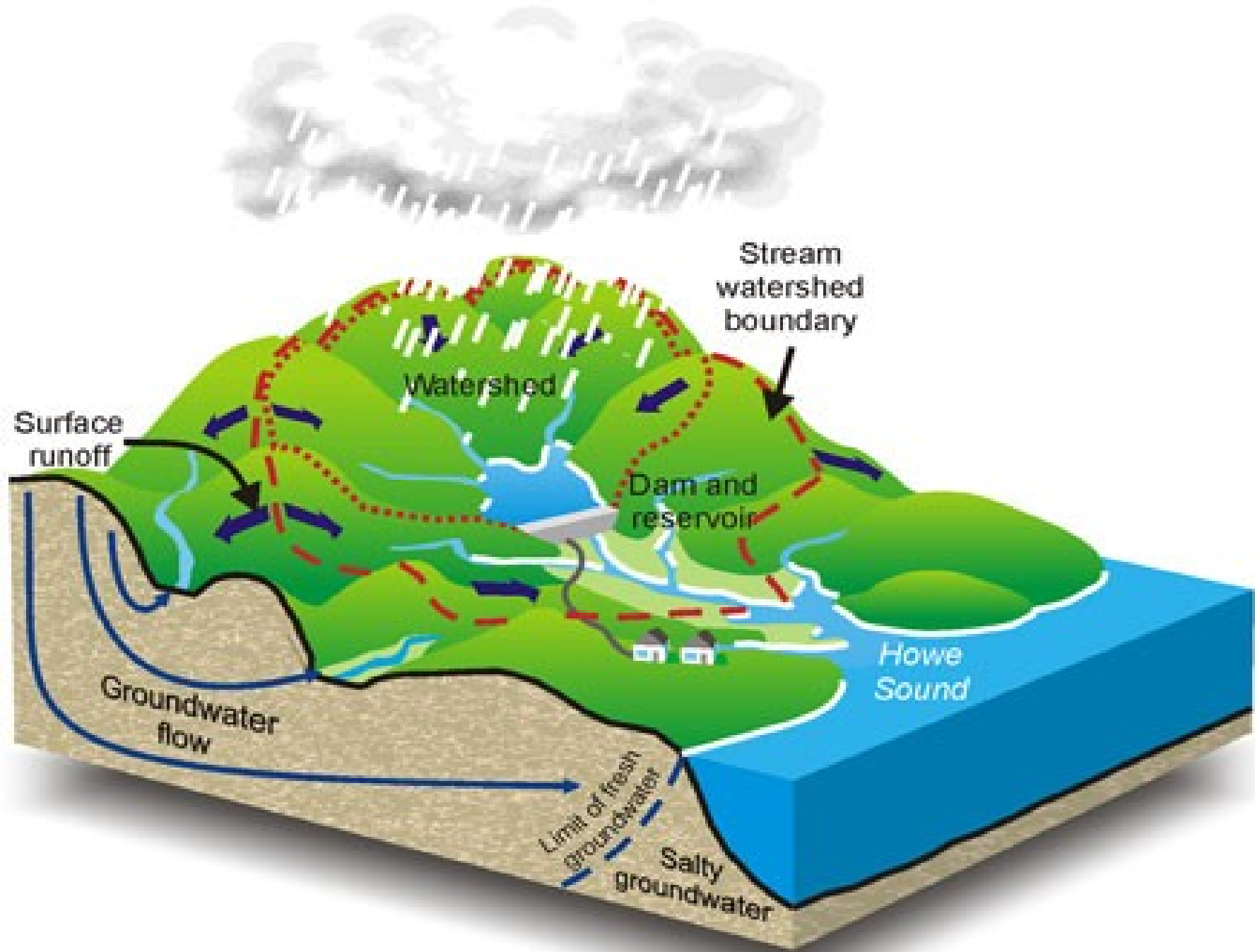
- Speed and direction of air
- Rainfall
- Types of clouds and their locations
- Temperature and pressure of air
- Latitudes and longitudes of the region
- Forecasting of hot and cold weather

## **Role of IT in human health:**

- Bioinformatics
- Maintaining DNA database
- Online medical transcription

# Watershed management

- A watershed is a geographical unit that collects, store, and release water.
- Collected water comes in the form of rain, snow and fog.
- River and stream, as well as ground flow release this water.
- **Himalaya** is the largest water shed.



# Types of watershed

- Macro-watershed :  $> 50,000$  hec
- Sub-macro-watershed: 10,000-50,000 hec
- Milli-water shed : 1,00-10,000 hec
- Micro-water shed: 100-1,000 hec
- Mini-water shed: 1-100 hec

Water shed may also be categorized as **hill or flat** water sheds, **humid or arid water shed**, **red soil water shed or black soil water sheds** based on soil, slope and climate etc.



# Water shed management

- Soil conservation
  - A forestation
  - Reforestation
  - Mulching
- Etc.

# **Environment Laws**

# Introduction of Environment law

- Tiwari Committee in 1980 emphasized to make legal framework to protect the environment.
- Article 48 A: The states shall endeavor to protect and improve the environment and to safeguard the forest and wildlife of the country.
- **Article 51: It shall be the duty of every citizen of India to protect and improve the natural environment including forest, lakes, rivers and wildlife with compensation for living creature.**

- Tiwari committee in 1980 their first National committee to issue the new relating environmental legislation and renew 200 old basic laws related to conservation and preservation of natural heritage.

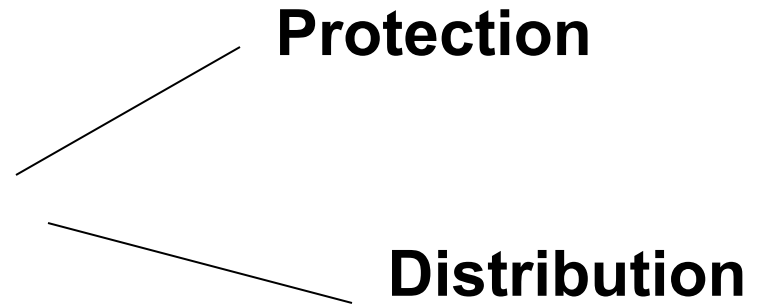
- These various laws operationally systematized or classified in to two general group:

1- Protecting legislation:

For human beings

For non-human beings

- Planning legislation:



Protective Legislation		Planning legislation	
For Human Beings	Non-Human beings	Production	Distribution
Water, Air, Noise, Nuclear radiation, Toxic substances	Wildlife, Marine life, Flora	Land utilization Irrigation Industry Mining Grazing Land Waste Land Catchments area	Town planning Sanctuaries Housing Parks Biosphere reserves

# Classification of laws

- **Primary laws:** Those which directly govern the activity of citizens and corporate bodies, these defines the legal duties and right of the concern, people including the sanction to be in case of violation.

- **Secondary laws:** Those which govern the activities of Government Department (Board, committee, tribunal) and non-governmental organization. These define the powers, rights, privileges, functions and duties of such bodies.

- **Tertiary Laws:** Those which governs the activities of the states. These pertain to the basic constitutional arrangement between the state and the central as well as between the state and different cooperate bodies.



# Role of Government in Environment Protection

- **Ministry of Environment and Forest and Wildlife, was set up in 1980.**
- **Ganga Action Plan, 1985**
- **National Wasteland Board, 1985**
- **Indian Board of Wildlife, 1952**

# **Role of Non-Governmental Organizations (NGOs)**

## Indian NGOs

- CSE (Center For Science and Environment), New Delhi
- CEE (Center for Environment and Education), Ahmedabad
- Bombay Natural History Society (BNHS), Since 1983
- Kalpvriksha, New Dewlh
- Wild Life Preservation Society of India, Dehradun  
Founded in 1958
- WFN-India (World Wide Fund for Nature), 1969, Bombay

# International NGOs

- WWF (World Wide fund for Nature), 1961, Gland Switzerland
- World Conservation Union, 1948, Switzerland
- Green Peace
- Friends of Earth