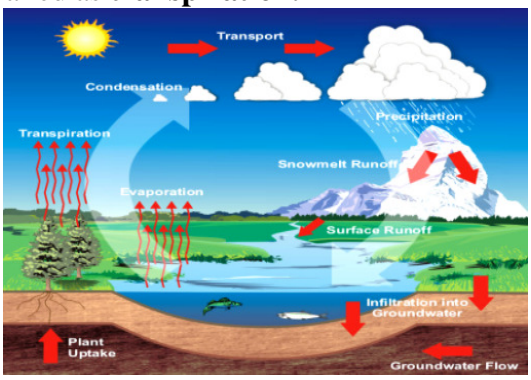
18. WATER AND ENERGY CONSERVATION

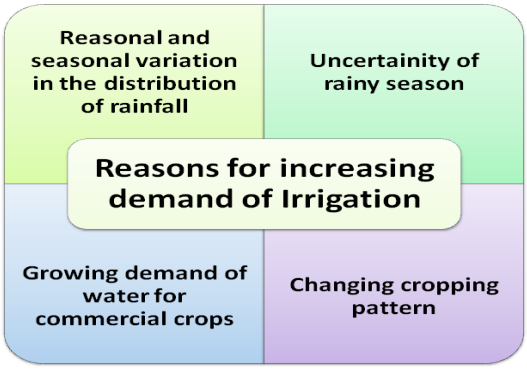
- Water is an indispensable natural resource as no life can exist without water. It is also renewable and reusable.
- Scientists estimate that nearly three fourths of earth is covered with water
- Only less than 1% of this water is fresh water and usable for living organisms including humans.
- **Hydrological cycle** is the journey water takes as it circulates from land to sky and back again. The sun's heat provides energy to **evaporate** water from the earth's surface (lakes etc.). Plants also lose water to the air called as **transpiration.**



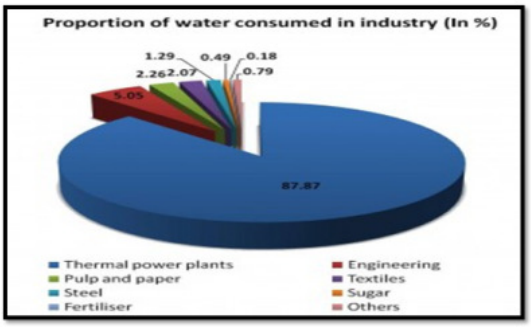
- **Factors responsible for increasing water demand**

a. Rising demand due to growing population.
We need water for drinking, flushing or draining sewage or human waste, domestic use, irrigation, industries.

b. Expansion of irrigation



b. Increasing demand by industry



c. Increasing water use due to changing life style

The life style of people has changed. Large number of attractive appliances, gadgets and fittings for kitchen and bathroom are available.

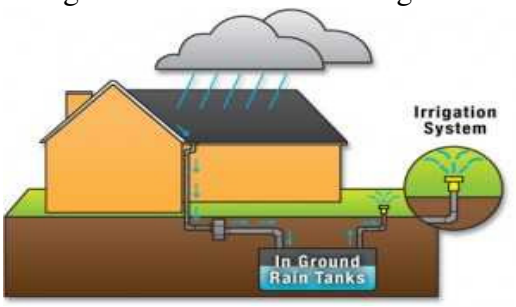
- **Need for conserving water**

We receive the second highest rainfall in the world, first being Brazil, but much less rain water infiltrates the soil or is retained to increase table. A sizeable amount of water is drained as run off (moving out from the soil surface) draining into the sea.

- **Methods of Conservation of Water**

- Agricultural lands close to cities can be irrigated with municipal wastewater.
- Household level recycled '**grey water** ' can be put to various uses to reduce pure water requirement.
- Pure water after used in bath and shower can be used for watering plants.

- Water harvesting is collecting rainwater that falls on a house or on and around any building and then putting it to use later on or simply replenishing the ground water by allowing the water to reach underground.



Groundwater recharge or deep drainage or deep percolation is a hydrologic process where water moves downward from surface water to groundwater.

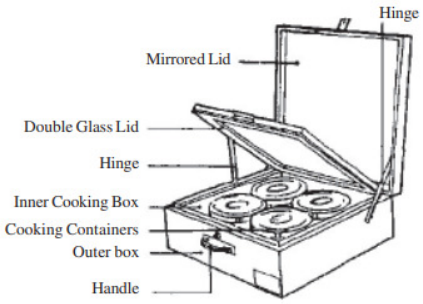
- **Management of water resources**
  The effective management and conservation of water has to incorporate the following two strategies:
  (1) Reduction in loss and wastage of water.
  (2) Removal of pollutants to transform polluted water into usable form.
- River pollution is mostly from discharge of effluents by industries / cities developed along river courses and from bathing, washing clothes and throwing garbage into rivers.
- To clean up the rivers, massive action plans have been launched by the Government of India.
  Two important action plans are:
  1. Ganga Action Plan (GAP)
  2. Yamuna Action Plan (YAP)

  Energy may be defined as the capacity to do work. Energy can be transformed from one form to another. However, energy can neither be created nor destroyed and cannot be recycled.
  The sources of energy may be:
  (i) renewable or
  (ii) non-renewable

- **Use of energy by society**
  - Heat or electrical energy is required for cooking.
  - Electricity is required for running various appliances like lights, fans, coolers.
  - Fuel such as petrol or diesel or compressed natural gas (CNG) is required in transport vehicles.
  - Energy (electricity) is required for pumping water up the multi-storied buildings.
  - Energy is required for the various industrial processes.
- The conventional sources of energy are the fossil fuels. They are **limited** and **non-renewable**
  1. Coal is solid. It is mined and then transported in trucks and trains. In our country coal mines are found in Raniganj, Jharia and Dhanbad in Bihar.
  2. Oil is liquid which is pumped out from the ground after drilling a well. It is sent to faraway places in oil tankers or pipe lines. Oil (petroleum) is used in automobiles and airplanes. In India oil is found along the west coast and in Digboi oil fields, Assam.
  3. Natural gas -is a mixture of gases. The gas we use for cooking which comes in cylinders is **LPG or Liquefied Petroleum Gas**. **Compressed Natural gas or CNG** is used in the public transport vehicles (buses, scooters, auto-rickshaws and taxi).
- With increased population and increased consumption of fossil fuel, it became necessary to look for alternative **non conventional sources of energy.**
  These are:
  - Solar Energy
  - Wind Energy
  - Hydel Power
  - Tidal Energy
  - Geothermal Power
  - Energy From Biomass

1. Conventional energy uses are practiced for a long time but non-conventional sources of energy are not used frequently and in large scale. Their uses are more recent.
2. Except hydel power, other conventional energy is costly. But, non-conventional energy is cheaper.
3. Except hydel power, conventional energies are non-renewable but there is no anxiety for exhaustion in non-conventional energy.

- **Solar energy** or energy from the sun is very important. It is widespread in nature is non-polluting and available free of cost. Solar energy is now harnessed through "solar panels" directly.



Solar cooker

Wind has the power to propel the blades of wind turbines. These turbines cause the rotation of magnets which creates electricity.

- **Hydro-power (hydel power)**
  Many dams have been built on rivers to store water at a height and then potential energy of the stored mass of water is converted to kinetic energy by letting the massive water flow over turbines.

- **Tidal/Ocean energy** is the energy of ocean or sea waves which derive energy from wind which in turn is driven by solar energy. Tidal energy can be transformed into electrical energy.

- **Geothermal power** is the heat energy or thermal energy present in the earth's crust. The heat in the uppermost part of earth is readily accessible and can be used to generate electricity.
- **Biomass** is renewable energy and shall be available as long as plants grow on earth.
- Fast growing trees such as Euphorbia, Jatropha etc. are planted.
- **Bioethanol-** is a alcohol made by fermentation mostly from carbohydrates produce in sugar or starch crops such as corn or sugarcane.
- It is also made from beet root by fermentation and distillation .Ethanol can be used as a fuel for vehicles in its pure form.
- It is made from vegetable oils and animals fats. Biodiesel can be used as a fuel for vehicles in its pure form.
- In India, Some oil yielding trees that can give biodiesel are –
  - ➢ Ratanjot or *Jatropha curcas*
  - ➢ Nagchampa or Callophyllum ionophullum
  - ➢ Rubber seeds or *Hevea braziliensis*.
- **Nuclear power or nuclear energy** is the use of exothermic nuclear processes to generate useful heat and electricity. This includes nuclear fission, nuclear decay and nuclear fusion.

- We have limited resources available on earth and our demands are continuously increasing day by day. Therefore we have to conserve energy and improve energy efficiency

➢ **At home**

- ➢ Do not waste electricity. Switch off lights and fans when not in use, minimize use by sharing common work place.
- ➢ Use fuel efficient hearths (Chulhas) for cooking.
- ➢ Cut only dry branches of trees for burning.
- ➢ Use the gas at simmer level. it saves cooking gas and makes cooked item healthier and tastier

- **At work place**
  - ➢ Use car pool / share the transport vehicles.
  - ➢ Switch off lights and fan when not used. Does not matter if somebody else is paying bills. It is not about saving money so much as it is about saving power.
  - ➢ Computer to be switched off when not in use.
- **In Transport sector**
  - ➢ To use public transport system as much as possible instead of using personal vehicles.
  - ➢ Car speed should be maintained as far as possible 50 to 60km/hr.
  - ➢ Moderate driving; driving at lower speed.
  - ➢ Take care to check and mend leak of fuel tanks and exhausts of vehicles.
  - ➢ Turning off a vehicles engine at stops rather than idling.

(i) Promotion of CFLs (Compact Fluorescent Light Bulbs)& LED bulbs (Light Emitting Diode)

a) CFL Bulbs:

- ➢ Mercury is an essential element in the operation of fluorescent lighting. It allows the bulbs to be an efficient light source.
- ➢ CFLs use less electricity than traditional light bulbs (75% less), and have long life span.

b) LED Bulbs

- ➢ Use of LED bulb emitting white light, uses less energy as compared to CFL bulb for producing same amount of light.
- ➢ LED bulb is environmental friendly as it does not have mercury.

(ii) Use of star rating of electrical equipments

- ➢ Bureau of Energy Efficiency (BEE) is an agency of the Government of India, created in March, 2002 under the provision of Energy Conservation Act.
- ➢ The agency's function is to develop programs which will increase the conservation and efficient uses of energy in India.

(iii) Transport and energy

- ➢ The transport sector is the fastest growing source of greenhouse gases.
- ➢ Of the total green house gas emissions from transport, over 85% are due to CO_2 emissions from road transport vehicles.
- ➢ Reducing energy waste requires improving energy efficiency by using less energy to do more useful work.

Check Yourself

1. Factors responsible for rising in water demand –
   a. Expansion of irrigation
   b. Growing population
   c. Increasing demand by rising
   d. All the above
2. When was GAP launched first time in india
   a. 1985
   b. 1981
   c. 1993
   d. 1995
3. Which one of the following way, we can not conserve water
   a. Reforestation
   b. Reuse and recycle
   c. Reduce soil erosion
   d. Maintaining water cycle
4. Fuel which are obtained from plants material is called---.
   a. Fossil fuel
   b. Biofuel
   c. Biodiesel
   d. Biogas
5. Name the institution which gives star rating to electrical appliances:
   a. BEE
   b. MNRE
   c. MOP
   d. IREDA

Ans: 1. a 2.b 3.c 4.b 5.a

Stretch Yourself

1. Expand YAP and GAP.
2. Define energy.
3. Give any two examples of renewable and non-renewable sources of energy.
4. What are the ways opted for management of water resources?
5. Expand LNG, CFL and CFL.

Test Yourself

Why do we consider water as indispensible natural resources?

1. How does rain water harvesting help in water conservation ?
2. Differentiate between tidal and wind energy.
3. How CFL does reduced electricity bill?
4. Mention five ways to conserve energy at household level.