

Sustainable Development

Introduction

"Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

The Sustainable Development objectives cover different aspects of social development, environmental protection and economic growth, and these are the main ones:

The eradication of poverty and hunger so as to ensure a healthy life.

Sustainable development encourages us to conserve and enhance our resource base, by gradually changing the ways in which we develop and use technologies.

Countries must be allowed to meet their basic needs of employment, food, energy, water and sanitation.

The principles of sustainability are the foundations of what this concept represents.

Therefore, sustainability is made up of three pillars: economy, society, and the environment.

These principles are also informally used as profit, people and planet.

The four main types of sustainability are human, social, economic and environmental.

It is important to specify which type of sustainability one is dealing with as they are all so different and should not be fused together, although some overlap to a certain extent.

Example 1.

Using recycled materials or renewable resources when building is an example of sustainable development.

Example 2.

Building a new community in a previously undeveloped area without destroying the ecosystem or harming the environment is an example of sustainable development.

The 17 sustainable development goals (SDGs) to transform our world:

GOAL 1: No Poverty

GOAL 2: Zero Hunger

GOAL 3: Good Health and Well-being

GOAL 4: Quality Education

GOAL 5: Gender Equality

GOAL 6: Clean Water and Sanitation

GOAL 7: Affordable and Clean Energy

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GOAL 8: Decent Work and Economic Growth

GOAL 9: Industry, Innovation and Infrastructure

GOAL 10: Reduced Inequality

GOAL 11: Sustainable Cities and Communities

GOAL 12: Responsible Consumption and Production

GOAL 13: Climate Action

GOAL 14: Life Below Water

GOAL 15: Life on Land

GOAL 16: Peace and Justice Strong Institutions

GOAL 17: Partnerships to achieve the Goal

The main challenges to sustainable development which are global in character include poverty and exclusion, unemployment, climate change, conflict and humanitarian aid, building peaceful and inclusive societies, building strong institutions of governance, and supporting the rule of law.

Urban problems related to energy:

Urban center use enormous quantities of energy. In the past, urban housing required relatively smaller amounts of energy than we use at present.

Traditional housing in India required very little temperature adjustments as the material used, such as wood and bricks, handled temperature changes better than the current concrete, glass and steel of ultra-modern building.

Cities are the main centers of economic growth, trade, education, innovations and employment. Until recently a big majority of human population lived in rural areas and their economic activities cantered on agriculture, cattle, rearing, fishing, hunting or some cottage industry.

It was some two hundred years ago with the dawn of industrial era the cities showed rapid development.

Now about 50% of the world population lives in urban areas and there is increasing movement of rural folk to cities in search of employment.

The urban growth is so fast that it is becoming difficult to accommodate all the industrial, commercial and residential facilities within a limited municipal boundary.

As a result there is spreading of the cities into the sub-urban or rural areas too, this phenomenon is known as “urban sprawl”.

In developing countries too urban growth is very fast and in most of the cases it is uncontrollable and unplanned growth.

In contrast to the rural set up, the urban set up is densely populated, consumes a lot of energy and materials and generates a lot of waste.

Energy use is closely related to development in industry, transport, communication, commercial, household and agricultural activities.

The energy requirement of urban population is much higher than that of rural ones. This is because urban people have a higher standard of life and their lifestyle demands more energy inputs in every sphere of life.

In urban areas the need of energy is increasing by leaps and bounds. Moreover, countries use energy in an uneven manner in the world.

In developed countries the amount of energy used is much more compared to developing countries.

Industrialized developed countries use energy for these purposes:

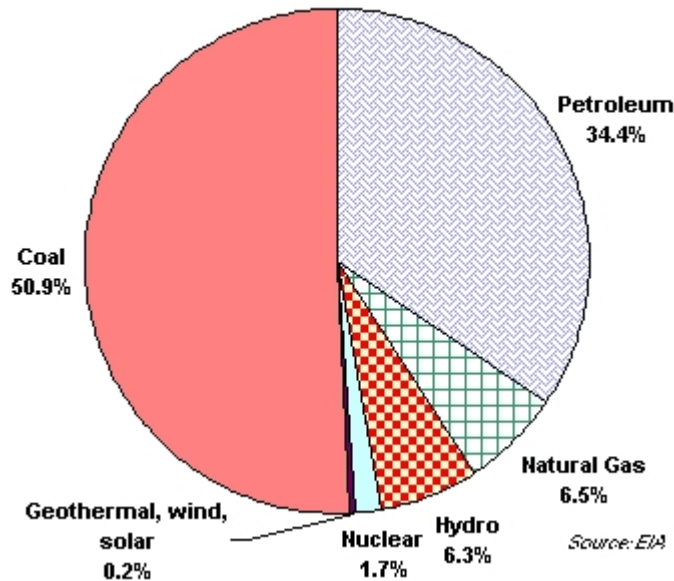
- i. Residential and commercial
- ii. Industrial
- iii. Transportation.

The two sources of energy are renewable and non-renewable energy sources.

Optimal usage shall be the ideal mode for energy conservation. For an integrated management system we should have renewable energy as well as non-renewable energy sources. At local level, biomass energy tapping, use of solar cooker, solar water heaters and solar photovoltaic cells must be encouraged. This shall be utilized besides the conventional energy from fossil fuels, hydel, thermal and nuclear power resources.

Due to high population density and high energy demanding activities, the urban problems related to energy are much more magnified as compared to rural

India's Fuel Share of Energy Consumption, 2001 (Btu)



population.

There are several hurdles that play havoc in energy conservation. They are:

- i. Lack of awareness
- ii. Attitude
- iii. Lack of technical knowledge
- iv. Market distortion
- v. Capital shortages.

Regardless of the level of economic development, it is essential to realize sustainable growth of the economies in order to maintain a world order, and restrictions on energy supply which may hinder a sustainable economic development should be avoided at all costs. At the same time, however, inefficient final energy consumption which may result in aggravation of the global environmental problems should not be allowed.

Rainwater Harvesting

Rainwater harvesting (RWH) is the collection and storage of rain, rather than allowing it to run off.

Rainwater harvesting system, also called rainwater collection system or rainwater catchment system, technology that collects and stores rainwater for human use.

Rainwater harvesting systems range from simple rain barrels to more elaborate structures with pumps, tanks, and purification systems.

Rainwater harvesting is a sustainable process that helps in preserving water for future needs.

Water scarcity is a major concern in today's scenario. The process of rainwater harvesting is a good way to conserve water.

Rainwater harvesting can be undertaken through a variety of ways:

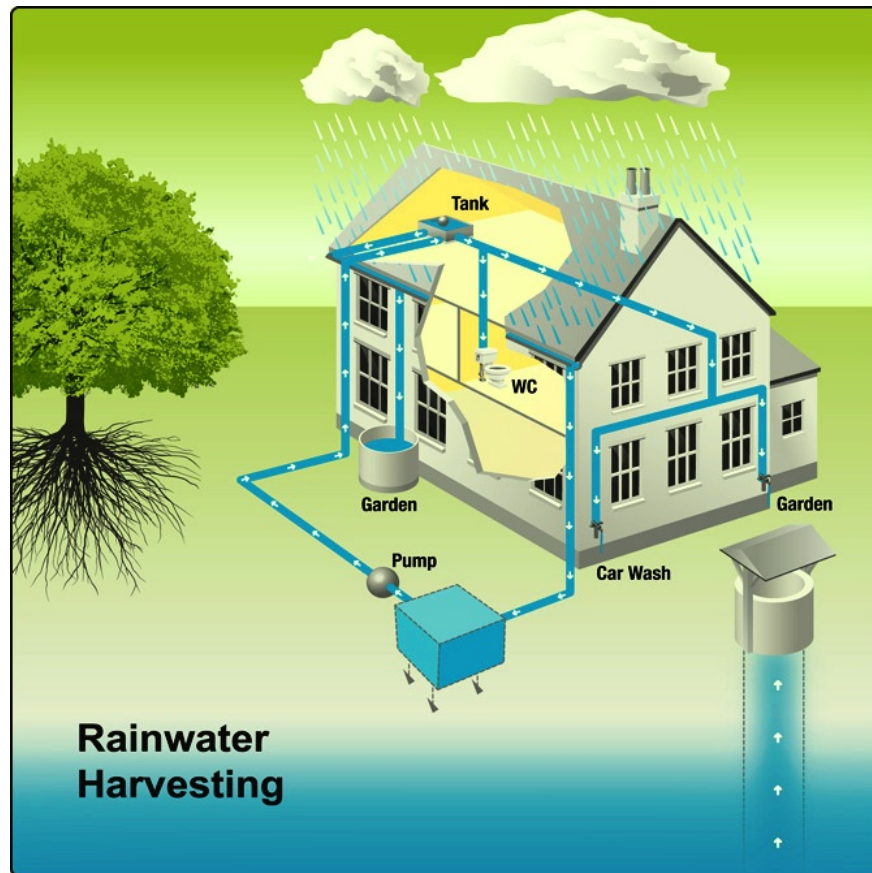
- i. capturing run-off from roof tops
- ii. capturing run-off from local catchments
- iii. capturing seasonal floodwater from local stream
- iv. conserving water through watershed management

How to Harvest the Rainwater?

Rainwater harvesting systems consists of the following components:

- Catchment- Used to collect and store the captured Rainwater.
- Conveyance system – It is used to transport the harvested water from the catchment to the recharge zone.
- Flush- It is used to flush out the first spell of rain.
- Filter – Used for filtering the collected Rainwater and remove pollutants.
- Tanks and the recharge structures: Used to store the filtered water which is ready to use.

The process of rainwater harvesting involves the collection and the storage of rainwater with the help of artificially designed systems that run off naturally



or man-made catchment areas like- the rooftop, compounds, rock surface, hill slopes, artificially repaired impervious or semi-pervious land surface. Several factors play a vital role in the amount of water harvested.

Some of these factors are:

- The quantum of runoff
- Features of the catchments
- Impact on the environment
- Availability of the technology
- The capacity of the storage tanks
- Types of the roof, its slope and its materials

- The frequency, quantity and the quality of the rainfall
- The speed and ease with which the Rainwater penetrates through the sub-soil to recharge the groundwater.

Why do we Harvest Rainwater?

The rainwater harvesting system is one of the best method practiced and followed to support the conservation of water.

Today, scarcity of good quality water has become a significant cause of concern. However, Rainwater, which is pure and of good quality, can be used for irrigation, washing, cleaning, bathing, and cooking and also for other livestock requirements.

Advantages of Rainwater Harvesting

The benefits of rainwater harvesting system are listed below.

- Less cost.
- Helps in reducing the water bill.
- Decreases the demand for water.
- Reduces the need for imported water.
- Promotes both water and energy conservation.
- Improves the quality and quantity of groundwater.
- Does not require a filtration system for landscape irrigation.
- This technology is relatively simple, easy to install and operate.
- It reduces soil erosion, storm water runoff, flooding, and pollution of surface water with fertilizers, pesticides, metals and other sediments.
- It is an excellent source of water for landscape irrigation with no chemicals and dissolved salts and free from all minerals.

Disadvantages of Rainwater Harvesting

In addition to the great advantages, the rainwater harvesting system has few disadvantages like unpredictable rainfall, unavailability of the proper stor-

age system, etc.

Listed below are few more disadvantages of the rainwater harvesting process:

- Regular Maintenance is required.
- Requires some technical skills for installation.
- Limited and no rainfall can limit the supply of Rainwater.
- If not installed correctly, it may attract mosquitoes and other waterborne diseases.
- One of the significant drawbacks of the rainwater harvesting system is storage limits.

Watershed Management

The word “watershed” introduced in 1920 was used for the “water parting boundaries”.

Watershed is that land area which drains or contributes runoff to a common outlet.

Watershed is defined as a geo-hydrological unit draining to a common point by a system of drains. All lands on earth are part of one watershed or other.

Watershed is thus the land and water area, which contributes runoff to a common point.

A watershed is an area of land and water bounded by a drainage divide within which the surface runoff collects and flows out of the watershed through a single outlet into a larger river or lake. Watershed technology is used in Rain fed areas.

Watershed management implies an effective conservation of soil and water resources for sustainable production with minimum non-point resources (NFS) pollutant losses.

It involves management of land surface and vegetation so as to conserve the soil and water for immediate and long term benefits to the farmers, community and society as a whole.

Catchment area is the water collecting area. “All the areas from which water flows out into a river or water pool”.



Types of Watershed Management:

Watershed is classified depending upon the size, drainage, shape and land use pattern.

- a. Macro watershed: 1000 -10,000 ha
- b. Micro watershed: 100 -1000 ha
- c. Mini watershed: 10 -100 ha
- d. Mille watershed: 1 -10 ha

Objectives of Watershed Management:

- a. Production of food, fodder, fuel.

- b. Pollution control
- c. Over exploitation of resources should be minimized
- d. Water storage, flood control, checking sedimentation.
- e. Wild life preservation
- f. Erosion control and prevention of soil, degradation and conservation of soil and water.
- g. Employment generation through industrial development dairy fishery production.
- h. Recharging of ground water to provide regular water supply for consumption and industry as well as irrigation.
- i. Recreational facility.

Main Components of Watershed:

- a. Soil and water conservation
- b. Water harvesting and water management
- c. Alternate land use system

Steps in Watershed Management:

Watershed management involves determination of alternative land treatment measures for, which information about problems of land, soil, water and vegetation in the watershed is essential.

In order to have a practical solution to above problem it is necessary to go through four phases for a full scale watershed management.

Program:

- a. Recognition phase
- b. Restoration phase
- c. Protection phase
- d. Improvement phase

a. Recognition Phase:

It involves following steps

- i. Recognition of the problem
- ii. Analysis of the cause of the problem and its effect.
- iii. Development of alternative solutions of problem.

b. Restoration Phase:

It includes two main steps

- i. Selection of best solution to problems identified
- ii. Application of the solution to the problems of the land

c. Protection Phase:

This phase takes care of the general health of the watershed and ensures normal functioning. The protection is against all factors which may cause determined in watershed condition.

d. Improvement Phase:

This phase deals with overall improvement in the watershed and all land is covered. Attention is paid to agriculture and forest management and production, forage production and pasture management, socio economic conditions to achieve the objectives of watershed management.

Water resource management plays a vital role in sustainable development of watershed which is possible only through the implementation of various water harvesting technique.

The efficient way for sub-surface water storage, soil moisture conservation or ground water recharge technologies should be adopted properly under water resource development plan.

The various measures adopted under soil and water harvesting is:

- i. Vegetative barriers
- ii. Building of contour bunds along contours for erosion and planting of horticultural contour species on bunds.

- iii. Furrow/Ridges and Furrow ridge method of cultivation across the slope
- iv. Irrigation water management through drip and sprinkler methods