MODULE 15 - WATER MANAGEMENT PRACTICES

OBJECTIVES

After going through this module, students will be able to:

1. Study the introduction of water management.
2. Study the use and over utilization of water.
3. Study the watershed management.
4. Study the ground water management.
5. Study the rain water conservation.
6. Study the agricultural water management.
7. Study the water management practices with regard to quality and domestic water management.
8. Study the industrial water management and waste water management.
9. Study how we can overcome from the problems of water.

SUMMARY

In this program have tried try to explain the shrinking of perennial water bodies present in the area is a serious problem. The problems flash flood due to poor vegetation cover and low infiltration rate and changes in surface and ground water hydrology are very common. The problem of drinking water supply in acute in several tribal villages also in cities. Climate change, population growth, increasing water demand, overexploitation of natural resources and environmental degradation have significantly degraded the world's freshwater resources. We have also explained the different accepts of water management practices like: Watershed Management, ground water management, rain water conservation, agriculture water management, water management practices with regard to quality, water management & domestic utilization, water management & industries, waste water management practices.

TRANSCRIPTION

Introduction to Water Management

Water has emerged as one of the primary environmental concerns for the 21st century. Water is the common name applied to the liquid form (state) of the hydrogen and oxygen compound H2O. Pure water is an odorless, tasteless, clear liquid. Water is one of nature's most important gifts to mankind. Essential to life, a person's survival depends on drinking water. Water is one of the most essential elements for good health. It is necessary for the digestion and absorption of food. In fact, human body is made of app.70% water.

Water covers approximately 70.9% of the Earth's surface, and is vital for all known forms of life. On Earth, 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other

large water bodies, and 0.001% in the air as vapor, clouds and precipitation. Only 2.5% of the Earth's water is freshwater, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products.

Many parts of the world are currently facing water shortages, and many more are likely to face water crisis in the future while others must face severe water pollution problems. There is an alarming lack of long term policies to target problems related with water quality and water management. The consequences are bleak social, economic and political instability, leading, in the worst case scenario, to violence over dwindling water resources. Immediate action is needed to overcome water problems.

Water management is the activity of planning, developing, distributing and managing the optimum use of water resources. In an ideal world water management planning pays attention to all the competing demands for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. This is rarely possible in practice.

Watershed Management

Rivers originate in streams that flow down mountains and hill-slopes. A group of small streams flow down hillsides to meet large streams in the valley, which form the tributaries of major rivers. The management of a single unit of land, with its water drainage system is called watershed management.

Water shed is an area which actually divide the flow of water. Two water sheds are divided by one reach & in between the water shed there are number of valley s so the concept of reach two water valley treatments is actually the whole essence of the water shed management. Water shed management not only involves the regulating the flow of water or controlling the flow of water but the same time the treatment of the earth surface is such a way that the velocity of water can be sufficiently controlled for our desired use, say for example, If the slope of the terrain is high in that case you can actually construct some structures which reduce the velocity of the water & in the process stop the soil erosion. This helps in many ways.

1. It reduces the soil erosion their by maintaining a good quality of soil on the slopes.
2. It actually increases soil moisture, at the same time which actually helps in rejuvenating the streams. This is the soul essence of water shed in which we take advantage of the earth surface & the structures are building accordingly to control the flow of water.

It is a technique that has several components. This includes soil and water management and developing vegetation. The natural drainage pattern of a watershed unit, if managed properly, can bring about local prosperity by providing a year-round supply of water, thereby improving the quality of life in the area.

Since it provides water throughout the year, this improves health in the community, as clean water become available. Watershed management enhances the growth of agriculture crops and even makes it possible to grow more than one crop in a year in dry areas.

Watershed management beings by taking control of a degraded site, through local participation. People must appreciate the need to improve the availability of water both in

quantity and quality for their own area. Once this is adequately demonstrated, the community begins to understand the project and people being to work together to promote good watershed management.
The first technical step is to take appropriate soil conservation measures. This is done by constructing a series of long trenches and mounds along the contours of the hill, to hold the rainwater and allow it to percolate into the ground. This ensures that underground stores of water are fully recharged. This is enhanced by growing grasses and shrubs and planting trees, which hold the soil and prevent it from being washed away in the monsoon. However, local grass cover can only increase if free grazing of domestic animals is regulated or replaced by stall feeding.

Ground Water Management

Groundwater is the major source of drinking water in both urban and rural India. Besides, it is an important source of water for the agricultural and the industrial sector. In 2000, about 50% of the existing groundwater was utilized. Being an important and integral part of the hydrological cycle, its availability depends on the rainfall and recharge conditions. Till recently it had been considered a dependable source of uncontaminated water.
The demand for water has increased over the years and this has led to water scarcity in many parts of the world. The situation is aggravated by the problem of water pollution or contamination. India is heading towards a freshwater crisis mainly due to improper management of water resources and environmental degradation This has lead to a lack of access to safe water supply to millions of people. Freshwater crisis is already evident in many parts of India, varying in scale and intensity depending mainly on the time of the year.
Ground water gets contaminated due to external sources as well as geogenic sources, Geogenic source contamination is something when some ingredients of the rocks itself include or induce some ground water pollutions. That also comes into ground water management strategies that whatever water which is free of impurities if it is available to us, how to use it..?
If the ground water is contaminated with some geogenic impurities how to make it useful for us..? All that includes in fact ground water management.
Ground water systems are for meeting the ever-increasing use of water. The proper design and management of these systems should, therefore, be a very important matter of concern.
In one particular site you might be having enough ground water to cater to a particular village or a town but the nearby village or nearby town may not be having any water; so in totality you have to take into the consideration that this ground water resource which is available in one particular village or a town is a common property of both the village or town. Because the other village or the other town is not having ground water reserves. This is what we call ground water management. This ground water management once the ground water sources are established after that withdrawal of ground water is monitored & then we come to certain calculation that how much ground water is needed, how much is to be conserved, how much is to be kept for further use, how much is to be allocated for what use. Ground water can be used for many use in fact not only for drinking water, it can be used for agriculture, it can be used for industry & so & and so forth.

So as to ensure that there is enough water of adequate quality to satisfy demand. Several management programs have been purposed to protect, preserve, and restore groundwater bodies.

Rain water conservation management

Our ancient religious texts and epics give a good insight into the water storage and conservation systems that prevailed in those days. Over the years rising populations, growing industrialization, and expanding agriculture have pushed up the demand for water. Efforts have been made to collect water by building dams and reservoirs and digging wells. The idea of groundwater recharging by harvesting rainwater is gaining importance in many cities.

Rainwater harvesting is accumulating and storing the rainwater for reuse before it reaches the aquifer. It has been used to provide drinking water, water for livestock, water for irrigation, as well as other typical uses. Rainwater collected from the roofs of houses and local institutions can make an important contribution to the availability of drinking water. It can supplement the subsoil water level and increase urban greenery.

Water collected from the ground, sometimes from areas that are especially prepared for this purpose, is called Storm water harvesting. In some cases, rainwater may be the only available, or economical, water source. Rainwater harvesting systems can be simple to construct from inexpensive local materials, and are potentially successful in most habitable locations. Roof rainwater may not be potable and may require treatment before consumption. As rainwater rushes from roofs it may carry pollutants, such as mercury from coal burning buildings, or bird faeces. Although some rooftop materials may produce rainwater that would be harmful to human health as drinking water, it can be useful in flushing toilets, washing clothes, watering the garden, and washing cars - these uses alone halve the amount of water used by a typical home.

Rain water conservation is one of the techniques by which we try to enrich ground water as well as enrich the surface water sources. Rain is a very important part of our hydrological cycle. Whatever water is available on the planet of earth it actually moves in a cycle which is called water cycle. Water cycle is a very simple cycle in which sea water first evaporates, forms clouds, comes back to earth surface as rains, trickle down the surface of earth, flows & then gets back to the sea. In the process the water comes in the contact with the earth, water sometimes gets frozen, forms glaciers, water sometimes peculates below the ground & becomes ground water, sometimes it alterates within soil & ground water souring the bed rock & becomes sub soil water. All these are the change of various forms of water from one form to other depending upon the physical process of which it is passing through.

Agriculture water management

Water is one of the most important inputs essential for the production of crops. Plants need it continuously during their life and in huge quantities. It profoundly influences photosynthesis, respiration, absorption, translocation and utilization of mineral nutrients, and cell division besides some other processes. Shortage and excess of water affects the growth and development of a plant directly and, consequently, its yield and quality.

Rainfall is the cheapest source of natural water-supply for crop plants. In India, however, rainfall is notoriously capricious, causing floods and droughts alternately. Its frequency, distribution and amount are not in accordance with the needs of the crops. Artificial water-supply through irrigation on the one hand, and removal of excess water through drainage on the other , therefore, become imperative, if the crops are to be raised successfully.
There are ways & means in fact with the invent of technology, with the invent of new systems we have now we are going in for water saving devices, like drip irrigation, or sprinklers. The better water use efficiency actually result in saving of lot of water which can b used for other purposes or which can be used for the areas in which the irrigation can't reach. These devices like sprinklers & drip irrigation systems save enough water for the water to be used judiciously. This is what actually is agriculture water management. You do be very very careful understand the implication if there is no water available for ground water not because ground water is not available but because of the competitive use. The Competitive use is when the water is been put to use by the industries or by the nearby cities the same water which is to be used for agriculture.
Water management in India, thus, comprises irrigation or drainage or both, depending considerably on the environmental conditions, soil, crops, and climate. It is a situation-oriented entity.
Water affects the performance of crops not only directly but also indirectly by influencing the availability of other nutrients, the timing of cultural operations, etc. Water and other production inputs interact with one another. In proper combinations, the crop yields can be boosted manifold under irrigated agriculture.
Water is a costly input when canals are used as the source of supply. The construction of dams and reservoirs, the conveyance of water from storage points to the fields, the operation and maintenance of canal systems involve huge expenses. The misuse of water leads to the problems of water-logging, salt-imbalance, etc., thus rendering agricultural lands unproductive. Hence, a proper appreciation of the relationship among soils, crops, climate and water resources for maximum crop production is essential.

Water Management practices with regard to quality

Water quality is a term used to describe the chemical, physical, and biological characteristics of water, usually with respect to its suitability for a particular purpose. Although scientific measurements are used to define water's quality, it's not a simple thing to say that "this water is good," or "this water is bad." After all, water that is perfectly good to wash a car with may not be good enough to serve as drinking water at a dinner party for the President! When the average person asks about water quality, they probably want to know if the water is good enough to use at home, to play in, to serve in a restaurant, etc., or if the quality of our natural waters are suitable for aquatic plants and animals.
Standards and guidelines are established to protect water for designated uses such as drinking, recreation, agricultural irrigation, or protection and maintenance of aquatic life.
We have to very judiciously select & mix the various water use which any water available to us can be put to use in fact whatever water available to us should be properly analyzed & seemed that whether this water which is unfit for one particular use can it be fit for other use, can it be fit for another use with some minimal treatment so that we can put all the water we have to some uses.

Standards for drinking-water quality ensure that public drinking-water supplies are as safe as possible. In India, the Ministry of Water Resources and the States are responsible for establishing the standards for constituents in water that have been shown to pose a risk to human health. Other standards protect aquatic life, including fish, and fish-eating wildlife such as birds.

Water Management & Domestic Utilization

Water use for drinking, cooking, washing, and cleaning contributes to the welfare of all household members. Like other responsibilities for household welfare, the responsibilities to provide water for consumption in gendered. In rural communities men may be responsible for the construction and maintenance of domestic water infrastructure, while women ensure that water is permanently available in the house, although other patterns have been reported as well. When the government or private vendors sell domestic water for cash, either men or women or both may be responsible for that household expenditure.

The gender issue at stake is the intra-household division of responsibilities for household welfare. A common long term vision is that spouses should equally share these unpaid domestic chores. In the short run, however, in poor urban and rural areas, the main issue is that the poor , especially poor women, need to be liberated from the often exorbitantly high cash or labor costs for mediocre water service and low quality sanitation. What is widely recognized as a basic human right, namely access to safe drinking water and sanitation, needs to be concretized. Whether the private sector or public sector is more effective in realizing this is an open issue, but public financial support remains necessary. In any case, water supply projects become considerably more effective if men's and women's complementary intra-household roles and perspectives are incorporated in project design and implementation, up to the decision making level.

Water Management & Industries

Water pollution is also caused by emission of domestic or urban sewage, agricultural waste, pollutants and industrial effluents into water bodies. Nowadays, one of the main sources of water pollution is the waste material discharged by industrial units, known as industrial water pollution. Waste materials like acids, alkalies, toxic metals, oil, grease, dyes, pesticides and even radioactive materials are poured into the water bodies by many industrial units. Some other important pollutants include polychlorinated biphenyl (PCB) compounds, lubricants and hot water discharged by power plants. The pollutants unloaded into the water bodies usually dissolve or remain suspended in water. Sometimes, they also accumulate on the bottom of the water bodies.

Another important pollutant, that can endanger marine life, is the oil spilled by oil tankers. As per the estimates of the United Nations, 1.3 million barrels of oil is spilled annually into the Persian Gulf, and about 285 million gallons is spilled into the oceans every year.

The industries contribute to more than half of the total water pollution. Industrial effluents

contain pollutants like asbestos, phosphates, mercury, lead, nitrates, sulfur, sulfuric acid, oil and many other poisonous materials. In many countries, industrial water is not treated adequately before discharging it into rivers or lakes. This is particularly true in the case of small scale industries that do not have sufficient capital to invest in pollution control equipment.

The treatment of the waste water before disposing off it to the ground is very very important very crucial, therefore the water management practices in an industry typically involves:

1. The source Location
2. Then the water transportation source to the industry
3. The Use of the water itself in the industry in a water efficient & user efficient manner.
4. The effluent which is generated is to be treated the treatment involved.
5. If it is to be reused or recycled the effluent is to be processed for further parameters to achieve.

   Thus any water management for any industry or in industrial sector require all these complex things.

Waste water Management practices

Wastewater is any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry, or agriculture and can encompass a wide range of potential contaminants and concentrations. In the most common usage, it refers to the municipal wastewater that contains a broad spectrum of contaminants, resulting from the mixing of wastewaters from different sources.

Sewage is correctly the subset of wastewater that is contaminated with feces or urine, but is often used to mean any wastewater. "Sewage" includes domestic, municipal, or industrial liquid waste products disposed off, usually via a pipe or sewer or similar structure, sometimes in a cesspool emptier.

The industrial effluents which are been generated out of the industry they are to be put to reuse or recycle. They are to put to reuse & recycle which minimum treatment for their regarding needs, for their horticulture needs, for their plantation needs, they can do it the municipal waste which is generated out of the cities can be used with some proper treatment for the municipal plantations, for the plantations at roadsides, for the local gardens or the small house gardens we have so all these techniques which are involving waste water use are called waste water practices. This waste water management typically involves

1. The collection of waste water at a particular site.
2. Treating it.
3. Ultimately putting it better use.

If the term "wastewater treatment" is confusing to you, you might think of it as "sewage treatment." Nature has an amazing ability to cope with small amounts of water wastes and pollution, but it would be overwhelmed if we didn't treat the billions of gallons of wastewater and sewage produced every day before releasing it back to the environment. Treatment plants reduce pollutants in wastewater to a level nature can handle.

GLOSSARY

1. **Acid Rain** is rain mixed mainly with nitric and sulphuric acid, that arise from emissions released during the burning of fossil fuels.
2. **Air Quality Standard (AQS)** is the prescribed level of a pollutant in the outside air that should not be exceeded during a specific time period to protect public health.
3. **Atmosphere** is the gaseous mass or envelope of air surrounding the Earth. From ground-level up, the atmosphere is further subdivided into the troposphere, stratosphere, mesosphere, and the thermosphere.
4. **Biomass fuels** is wood and forest residues, animal manure and waste, grains, crops and aquatic plants are some common biomass fuels.
5. **Conservation** is the planning and management of resources to secure their long term use and continuity and better their quality, value and diversity. It is the use of less energy, either by using more efficient technologies or by changing wasteful habits.
6. **Environmental impact** is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services. An environmental impact addresses an environmental problem.
7. **Fossil fuels** such as coal, oil, and natural gas are so-called because they are the remains of ancient plant and animal life.
8. **Natural sources** are the non-manmade emission sources, including biological and geological sources, wildfires, and windblown dust.
9. **Organic waste** is the material that is more directly derived from plant and animal sources, which can generally be decomposed by microorganisms.
10. **Reservoir** is any natural or artificial holding area used to store, regulate, or control a substance.
11. **Sustainable development** implies economic growth together with the protection of environmental quality, each reinforcing the other. The essence of this form of development is a stable relationship between human activities and the natural world, which does not diminish the prospects for future generations to enjoy a quality of life at least as good as our own.

FAQs

Q1. What is Water Management?
A. Water management is the activity of planning, developing, distributing and managing the optimum use of water resources.

Q2. What is water harvesting?
A. Rainwater harvesting essentially means collecting rainwater on the roofs of building and storing it underground for later use. Not only does this recharging arrest groundwater depletion, it also raises the declining water table and can help augment water supply.

Q3. How we can improve the water quality?
A. To improve the water quality, a detailed quantification and characterization of the pollutants discharged is required besides ensuring that none of the sources is discharging untreated or partially treated wastes into the river body.

Q4. How much of the human body consists of water?
A. Humans mainly consist of water, it is in all our organs and in is transported throughout our body to assist physical functions. When a human does not absorb enough water, dehydration is the result. This is not very surprising, given that App.70% of the human body consists of water.

Q5. How can water supplies be increased?
A. There are five ways to increase water supplies in a particular area: build dams and reservoirs to store run-off, bring in surface water from another area, withdraw groundwater, convert salt water to freshwater (desalination) and improve the efficiency of water use.

Q6. What defines the quality of water?
A. Water quality is an important parameter touching on all aspects of ecosystems and human well-being such as the health of a community, food to be produced, economic activities, ecosystem health and biodiversity. Therefore, water quality is influential in determining human poverty, wealth and educational levels also.

Q7. What is meant by water conservation?
A. Water conservation refers to practices, techniques, and technologies that improve the efficiency of water use, thereby reducing overall demand. Increased efficiency expands the use of the water resource, freeing up water supplies for other uses, such as population growth, new industry, and environmental needs.

Q8.What is municipal solid waste?
A. Municipal Solid Waste or MSW, which is commonly called trash or garbage consists of everyday discarded items such as, bottles, food scrapes, newspapers, appliances, paint, batteries, and oil.

Q9. How can we utilize waste?
A. Waste can be utilized after proper treatment to kill pathogens and may need to be modified in form for utilization. Composting, using industrial sludge of organic nature as fertilizers, irrigation with wastewater, use of coal ash as building material- these are some of the ways waste can be reutilized for economical and environmental benefits.