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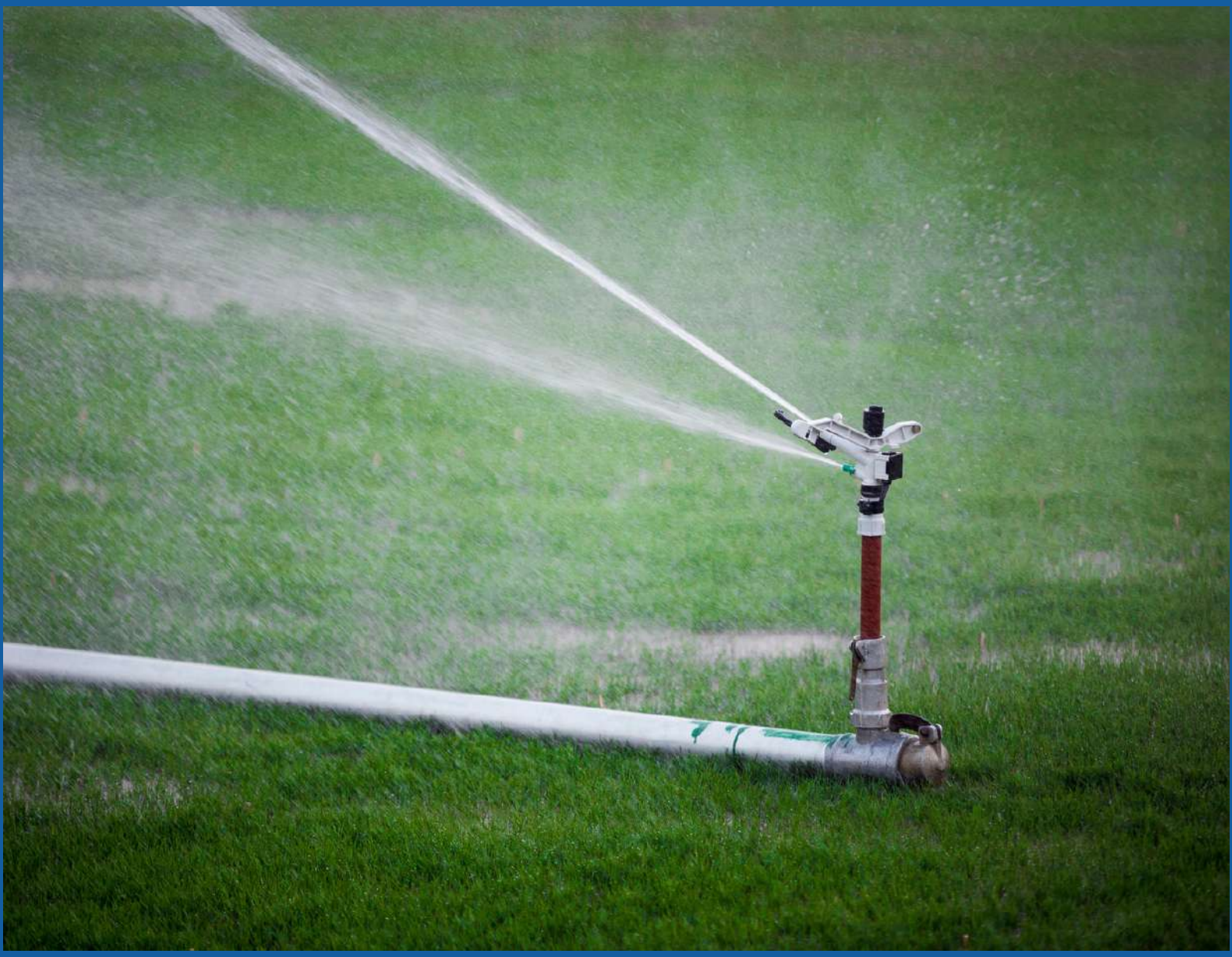
WATER RESOURCES

ARD Notes for NABARD Gr. A Exam



NABARD GRADE A EXAM

Water Resources

ARD Notes for NABARD Gr. A Exam

Water resources are natural resources of water that are potentially useful as a source of water supply, Natural sources of freshwater include surface water, under river flow, groundwater and frozen water, Artificial sources of freshwater can include treated wastewater (reclaimed water) and desalinated seawater.

Command Area Development

In all five-year plans, considerable importance was given to the creation of additional irrigation potential. However, the potential actually utilized was much below, the irrigation potential created over the years in major and medium works was not fully utilised and the gap between the potential created and the actual utilisation was widening.

This non-utilization occurred mainly because there was a delay in construction of the field channels and drains, Lack of involvement of farmers is also an important constraint.

In 1974-75, the Government of India launched the Command Area Development programme to bridge/narrow the gap between irrigation potential created and actually utilized in major and medium irrigation schemes, this scheme was supposed to develop adequate delivery of the irrigation water up to the fields, A **Command Area Development Authority** was established to maximize the productivity in the irrigation command areas through an integrated approach with the following components:

- Construction of field channels and field drains
- Land shaping wherever necessary
- Introduction of rotational supply of water to ensure equitably and assured distribution to individual farm holdings.

But the CAD Programme was not particularly successful because of three constraints:

- The water supply at the outlet was unreliable
- The available technology was could not be adopted properly
- Farmers particularly did not participate in the scheme.
- This programme was restructured and renamed as Command Area Development and Water Management Programme (CADWMP) on April 1, 2004. The scheme was further restructured and was thrown to states to implement in 2008-09.

Currently**, Command Area Development Programme** has also been amalgamated with the AIBP to reduce the gap between irrigation potential that has been created and that is utilized.

Water Conservation Techniques

Water is an important natural resource. All the organisms depend on water to live and grow, 97% of Earth's surface is covered with water, and only 3% of water is safe and drinkable, it is found in a frozen state in mountains and glaciers.

Water is a renewable resource and is used in every work, The water is used by plants for the uptake of minerals and nutrients, The human also used water in agricultural, industrial, household, and recreational related activities. The groundwater is used for drinking; however, it is present in less amount and decreasing day by day.

Sources of Water

Water is necessary for every organism to live its life. Water has various sources. The sources of water are:

- **Rivers:** Rivers are one of the important sources of water. The water of these rivers goes into the dam which goes to pipeline and finally comes into households.
- **Lakes:** Lake is also the source of water. People living near lakes or villages depend on the lake water for agricultural and other works.
- **Oceans:** oceans cover most of the Earth's surface. However, the oceanic water is too salty and is not drinkable. The river water goes and fallen into these oceans.

Reasons for a reduction in the level of surface water and groundwater:

The availability of fresh water is decreasing day by day, The level of groundwater in the world is rapidly decreasing, many parts of the world start facing water scarcity, The reasons for the reduction in the level of freshwater are:

- Pollution is one of the important reasons for the decreasing level, The polluted substance or chemicals which comes from industries and agricultural fields get mixed into water bodies like lakes and rivers etc. and make the surface water polluted.
- Another important reason the too much extraction of groundwater, In many places, we can see that the pipelines are fitted in depth which causes a reduction in the level of groundwater.
- Climate change also affects the level of groundwater. Climate changes cause shrinkage of mountains and glaciers rapidly.

Water Conservation Methodologies:

- Rainwater harvesting
- Sustainable use of groundwater
- Recreation of traditional water sources
- Use of advanced irrigation methods
- Flood management system
- Dam and reservoir construction
- Adopting water conservation habits

- Protection of water from pollution
- Rainwater Harvesting and its Advantages

Rainwater Harvesting:

It is a technique that is used to collect and store the water of rain. To do this, the rainwater is collected in the roof-like structure and connected to a tank or any storage reservoir, it is one of the traditional and easy methods of water conservation.

- The water collected by this technique is used in industries, agricultural field, and other household works.
- The harvested water is used for long term storage or to recharge groundwater.
- The factors that affect the amount of water harvested are roof construction pattern and material used, frequency and quantity of rainfall, storage tank capacity and type of soil from which water penetrates.

Advantages of Rainwater Harvesting are:

- It is economic
- Enhance water and energy conservation
- Fulfil the needs of water in water scarcity areas
- Helps in raising the groundwater level
- Can be set up at home or easily setup any place
- Sustainable use of groundwater

One of the water conservation methodologies is to sustainably use water. The sustainable use of water means uses water in a manner that it meets the present needs of the organism but also made it available to the future generation.

The groundwater contributes 25%, and surface water contributes 75% to meet the needs of organisms. The demand for groundwater is rapidly increasing, and hence the level of groundwater goes on decreasing. The re- infiltration of water takes a long time, so there is a need for sustainable use of water.

Recreation of Traditional Water Sources

- The recreation or renovation of traditional water resources should be done.
- This is helpful to fulfil the need for water in scarcity areas. Renovation of these resources is necessary from time to time to ensure the working of these sources.
- Example of these is Kere of Karnataka, Dong Pokhara of Assam etc.

Use of Advance Irrigation Methods

- According to a study, 69% of water is used in the agricultural sector at the World level.
- Surface water is obtained from canals and tanks while groundwater is obtained from tube wells and well.
- In modern days, countries adopting various modern irrigation techniques.
- In India, drip irrigation is used widely.
- In this method, the pipes are spread in the field which has holes just at the place of crops and hence no water is wasted.

Flood Management System

- The flood is also one of the causes of wasting surface water.
- In order to conserve surface water, canal and embankments should be constructed.
- The canals and embarkments contain excess water and are used for various purposes.
- The flood minimizes by afforestation.

Dam and Reservoir Construction

- The dam and reservoir construction are also one of the methodologies to reduce water crises in India.
- The water collected in dams is used for electricity generation.
- The reservoir water also used in various activities like irrigation and household activities.

Adopting Water Conservation Habits

Adopting water conservation techniques in daily life is the most important method to conserve water.

The methods are:

- Use of bucket to wash car and vehicles instead of pipes.
- Use of bucket for bathing instead of a shower.
- Turn off the tap when not in use.
- Check faucets and pipes for the leak.
- Re-use of greywater.
- Adopting modern irrigation techniques.
- Adopting the crop pattern which requires less water.
- Protection of water from pollution

Objectives of Water Conservation:

Water conservation is essential for all organisms.

The objectives of water conservation are:

- Ready for a future disaster like drought
- Cost-effectiveness
- Minimize the wastage of water
- Ready for a future disaster like drought
- The objective of conservation of water is to get ready for future disasters like drought.
- The conserved water is used during the time of drought and also in water scarcity areas.
- This water is also helpful in agricultural activities and other household work when there is a shortage of water or in remote areas.

Cost-effectiveness

Water conservation is also helpful in controlling the price of water. When we have stored water, we can use it many works through which surface water and groundwater is used for drinking and guards the rise in the price of water. Today in many parts of the country, the cost of drinking water is increasing due to less availability of water.

Minimize the wastage of water

The conservation of water also minimizes the wastage of water. Adopting the right conservative habits, we can stop or reduce the wastage of water

Micro-Irrigation

- Micro irrigation is a modern method of irrigation; by this method water is irrigated through drippers, sprinklers, foggers and by other emitters on the surface or subsurface of the land.

- **Major components of a micro irrigation system are as follows**.
  Water source, pumping devices (motor and pump), ball valves, fertigation pieces of equipment, filters, control valves, PVC joining accessories (Main and sub main) and emitters.

Advantages of Drip Irrigation System

- Water-saving and higher yield
- High quality and increased fruit size
- Suitable for all types of soil
- Easy method of fertigation and chemigation
- Saving in labour and field preparation cost

Disadvantage of Drip Irrigation System

- High initial investment
- Clogging of emitters
- Possible damage of system components due to animals, etc.
- Investment cost mostly differs based on spacing of the crops

Irrigation Pumps

- **Irrigation pumps are used to pump water from a lower to a higher level** from which the water then flows through channels to the fields requiring irrigation (lift operation) or to raise it to the required pressure head so that it can be sprayed on the fields via piping systems (sprinkling).
- An irrigation system is an extremely efficient and effective way of keeping areas green and healthy.
- For any irrigation system to work, however, you will require a pump in order to move the water.

❖ **Floating Pumps** A floating pump is a submersible or turbine pump that is attached to a float, and actually hangs beneath it.

❖ **Booster Pumps** A booster pump is a pump that is used as part of an irrigation system in order to improve the water pressure running throughout the system.

❖ **Turbine/Jet Pumps** A turbine pump is essentially defined as a centrifugal pump that is mounted underwater and then connected to a motor above the water by a shaft.

- **Submersible Pumps** A submersible pump is where the entire pump, including the motor, is underwater, and the pump and motor are part of a single unit.

- **End Suction Centrifugal Pumps** This is the most common type of pump with the pump itself being mounted on the end of the motor (close-coupled).

- **Centrifugal Pumps** A centrifugal pump uses an impeller to spin the water rapidly inside a special housing, and the force created by this moves the water throughout the pump.

- **Displacement Pumps** Displacement pumps include piston pumps, rotary pumps, and diaphragm pumps and they move water through using displacement.

Major, Medium and Minor Irrigation

Irrigation works have been classified as major, medium, and minor, depending on their culturable command area.

- **Major Irrigation:**

  - Various irrigation schemes in India were classified by the erstwhile planning commission into three parts viz. Minor, Medium and Major Irrigation schemes.
  - Culturable command area (CCA) more than 10,000 hectares.

- **Medium Irrigation:**

  - Culturable command area more than 2,000 hectares but less than 10,000 hectares.

- **Minor Irrigation:**

  - Culturable command area up to 2,000 hectares.
  - Whereas major and medium irrigation works are meant for tapping surface water (e.g., rivers), minor irrigation mainly involves groundwater development, e.g., tube-wells, boring works, etc.

Major Irrigation Scheme:

- Major irrigation schemes are those schemes that have Culturable Command Areas of More than 10,000 hectares.

Medium Irrigation Schemes:

- The Medium Irrigation Schemes have a CCA of 2,000-10,000 hectares.

Minor Schemes:

- Those with Culturable command areas up to 2000 hectares.
- Cultural command area is the basis for the design of the watercourse and basis for the design of an irrigation project.
- It is the proportion of the Gross Command Area which is Culturable and cultivable.

Sources Referred:

- Livemint Articles
- Ministry of water resource

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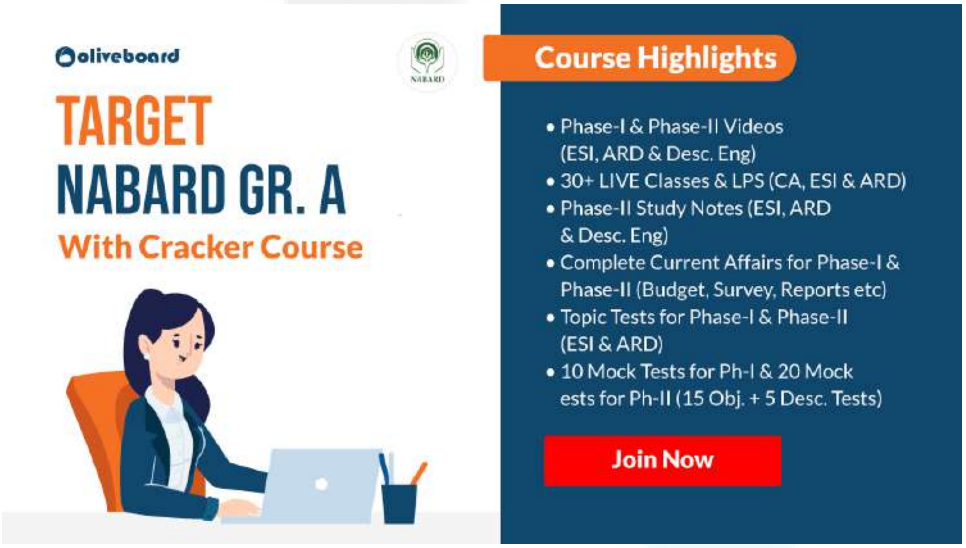

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