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An Experimental Study on Irrigation Method and Structure

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***Abstract*: The pressure for survival and the need for additional food supplies are causing the rapid expansion of water throughout the world. The importance of water and good environment has been realized from Vedic times. In this paper I am introducing some techniques and methods to develop the water availability for irrigation for crops. There are some types of water reservoir explained from where we can fulfill the requirement of water during summer season.**

***Keywords*: irrigation**

1. Introduction

Hydrology is the earth science dealing with the occurrence and movement of water upon and beneath the land areas of the globe. All precipitation results from the earths unending moisture cycle, called hydrologic cycle. In the hydrologic cycle, soil act as a reservoir and water is always in transitory storage in the soil.

A. Surface water resources

Water for irrigation is obtained from natural streams or rivers, from surface reservoirs and from underground reservoir. Flood water from rivers is collected in surface reservoir by constructing dams at suitable sites and by diverting water by constructing weirs. Water from underground reservoir is utilized by constructing wells and installing pumps. Water from surface reservoir or diversion point is conveyed through canals.

1) Classification of irrigation works

Classification of irrigation works in India, the clarification of irrigation schemes has changed over the years from the basis of the extent of culturable command area of the project to that of expenditure involve in the project and back again to the basis of culturable command area. Irrigation projects in India are presently classified into the following three categories:

1. Major irrigation projects - all irrigation schemes with a culturable command area of 10,000 ha or more are classified as major irrigation projects.
2. Medium irrigation projects - projects having a culturable command area of 2000 ha to 10,000 ha are classified as medium irrigation projects.
3. Minor irrigation projects - all irrigation schemes having a culturable command area upto 2000 ha individually are classified as minor irrigation projects.

2) Development of irrigation in India

The practice of irrigation in India has been carried on since very early days. Ancient Indian literature and history refers to wells, tanks and canals and the importance given to their construction for the welfare of the people by various rulers. The period of 1836 to 1866 is marked by investigation, development and completion of four major diversion works viz, the Upper Ganga Canal, the Upper Bari Doab Canal and the Krishna and Godavari Delta Systems. The commission recommended a number of measures to stimulate the construction of private works and drew up a 20-year plan to irrigate 2.6 million hectares by public works. Between 1930-40, the area irrigated by wells in the provinces registered an increase of about 17%, i.e., from 4.75 million hectares to 5.57 million hectares and those from all sources, other than Government canals, by 13% i.e., from 10.8 to 12.2 million hectares.

3) Reservoir for irrigation water

a) Canal system

An irrigation canal system consists of a number of canal works and canal reaches. A canal takes off from the head works of either a water storage dam or barrage or a diversion dam.

b) Tanks and ponds

Surface reservoir, storing rainfall runoff from catchment areas of contributing watershed and collecting seepage from surrounding water bearing formations beneath the ground surface, are called tanks. In Orissa irrigation practice in India, tanks are small reservoir usually behind earthen dams.

c) Lift irrigation

Surface water pumping schemes play vital roles in areas where the topography does not permit gravity flow irrigation through diversion or storage works. In lift irrigation projects, water is lifted directly from rivers or streams from suitable points at different segments of a canal system or from a tank.

d) Ground water

The ground water is the water which percolates through air voids present in the soil. The rain water directly move downwards and infiltrate into the soil which can be further use for domestic purpose, irrigation etc.

e) Wells

Water well is a hole, usually vertical, extending into the water bearing formation below the ground surface.

f) Dam

A dam can be central structure in multipurpose scheme designed to conserve water resources on a regional basis.

B. Structures for water distribution in irrigation

Various kinds of structures are used to control and convey irrigation water on the farm. The purpose of the farm water distribution system is to carry the required irrigation stream from the source to the individual furrow, basin or border.

1) Water conveyance structures

It is often necessary to carry water across roads, hillsides and natural depression.

1. Flumes

A flume is an overhead channel constructed of wood, metal or concrete, and supported from the ground surface by pillars affixed to bridges, to carry water across gullies, ravines or other natural depression.

2. Culverts

When a farm irrigation channel crosses road, ridge, depression app low lying stream, it is frequently necessary to construct a culvert is an inverted siphon.

3. Inverted siphon

Where the road surface lies too close to the field surface to permit using a culvert, out or if the channel surface is higher than the road, an inverted siphon is the appropriate structure to construct fir crossing the road.

a) Erosion control structures

It is often necessary to build irrigation channels down hillsides so steep that the water will cut gullies, if allowed to flow uncontrolled. To prevent such a damage, the following are used to prevent the channel from eroding.

4. Drop structures

A drop structure is used to discharge water in a channel from a higher level to lower one and dissipate the energy of flow due to the drop inlet structure.

5. Pipe drop structures

Sometimes, the construction of an open drop structure is not possible without disturbing an existing earthen bund or dam.

6. Chutes

Chute structures convey water down a steep slope. On steep slopes, drop structures would be ago close together that it may be more practical to use a chute to convey the water to the lower field.

b) Water control structures

Water controlling structures are necessary for easy and accurate application of irrigation water.

7. Diversion boxes

A structure is required to divert the stream into the proper channels to distribute the flow to two or more branch channels in carrying water to different parts of farm.

8. Checks

A check is a structure placed in the channel to form a dam to control the level of water in order to facilitate irrigation.

9. Portable check dams

Canvas and sheet metal dams and masonry check dams with slide gates are suitable to check water and raise or control water surface elevations in unlined channels.

10. Turnouts

A turnout is used to take water from a lateral channel into a field supply ditch or from a ditch into a field. Turnouts may be portable or built in and are provided with gates.

11. Siphon tubes

Siphon tubes convey water over a ditch bank into a field or furrow. They are made of plastic, rubber or metal (aluminum or sheet iron) and are commercially available in different sizes.

C. Quality of irrigation water

Irrigation water usually is not found in its pure state, but mostly with foreign solid particles and other impurities. The solid content in irrigation water mainly consist of dirt and suspended inorganic matter (silt, sand, leaves, fine clay and rust dust) and organic substances (algae, bacteria, protozoa) from vegetative origin and living organisms and bacteria populations.

D. Effects

The effect of water irrigation methods are as follows:

1) The water is equally distributed through sprinkler system.
2) The moisture and water content presence in the land is for long time.
3) The less labor requirement for making bunds for water supply.
4) Water is available in summer season from dams and tanks.
5) The maintenance cost of pipes and irrigation machines is low.
6) Water supplied to crops in minimum time.
7) Large areas can be covered and irrigated in fewer amounts.

2. Conclusion

To introduced to current and future water demands, increased observation should be given to preventive approaches such as original uses of natural supplies and new technologies. In the past we have reply to bykeep in reserve runoff in reservoir, diverting flows from water abundant to water scarce regions, and extracting aquifer resources methods that provided ample water where and when it was needed. Smart water resources, such as water reuse and desalination, are being increasingly used and new technologies such as artificial recharge are also becoming more and more common.

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