

Sec-D

ARTIFICIAL RECHARGE OF GROUND WATER

DEFINITION :-

In order to increase the natural supply of ground water, people artificially recharge ground water basins.

Artificial Recharge may be defined as the process by which the ground water is enlarged (increased) at a rate much higher than those under natural condition of percolation or natural movement of the surface water.

PURPOSE :-

In most low rainfall areas of the country, the availability of utilizable surface water is so low that people have to depend largely on the ground water for agriculture and domestic use. So in order to improve the ground water situation it is necessary to artificially recharge the depleted ground water aquifer.

These should be constructed where ground water quality is poor and there is no alternative source of water.

Artificially Recharge projects are designed to serve one or more of the following purposes —

- * Maintain or augment the natural ground water as an economic resource.
- * Coordinate operation of surface and ground water reservoirs.
- * Conservation and storage of excess surface water for future requirements.
- * To improve the quality of the existing ground water through dilution.
- * Provide a treatment to remove the bacteriological and other impurities from sewage and waste water by natural filtration, so that water is suitable for re-use.

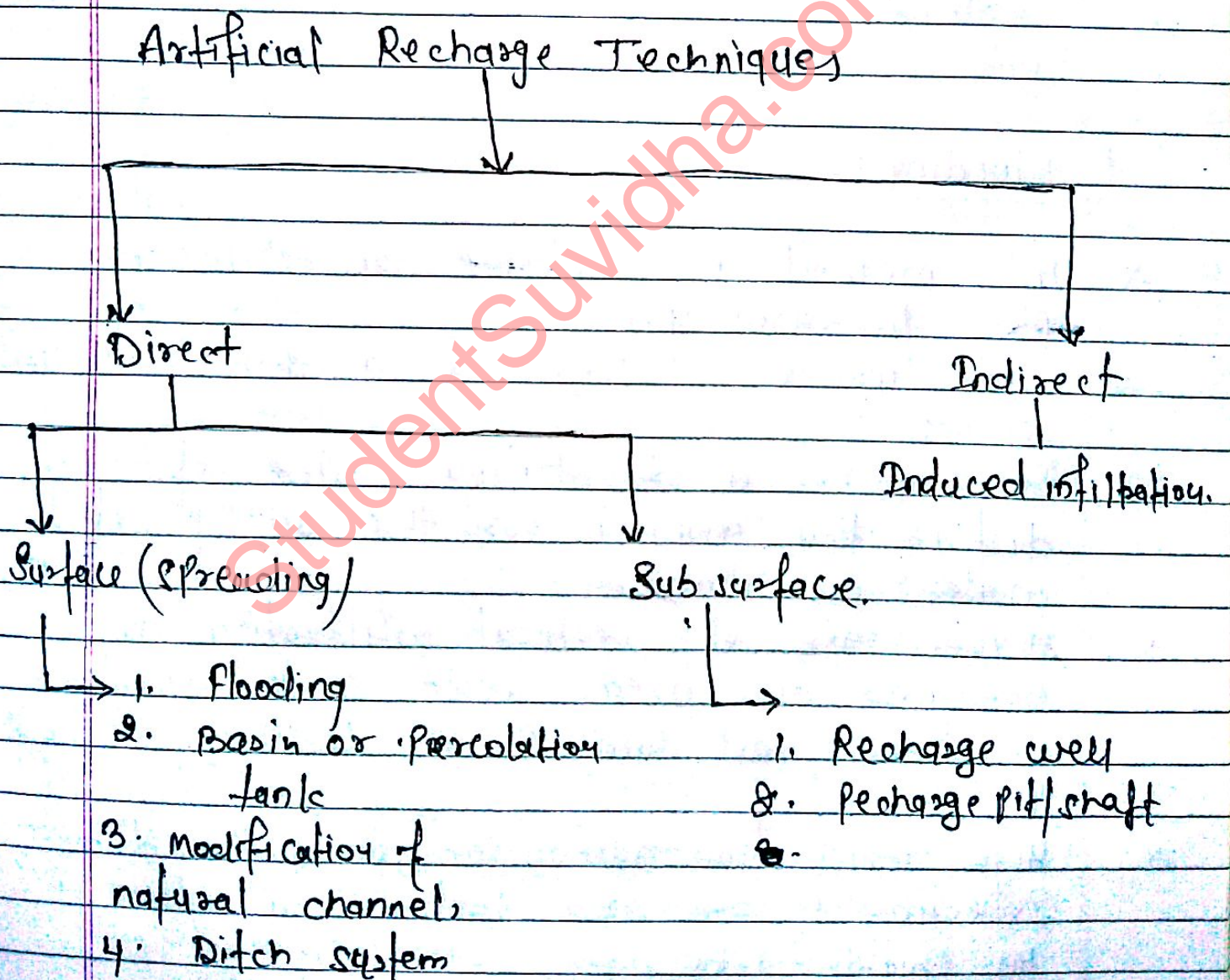
Thus,

in most situations, artificial recharge projects not serve as water conservation mechanisms but also assist in overcoming problems associated with the overdraft.

Methods of Artificial Recharge of Ground Water :-

(A) Spreading Methods :-

The techniques of artificial recharge can be broadly categorised as follows—



Surface (Spreading) method :-

These methods are suitable where large area of basin is available and aquifers are unconfined without impervious layer above it. Water quality also affects the rate of infiltration.

The various spreading methods are as below—

1. Flooding :-

- * This method is suitable for relatively flat topography.
- * The water is spread as a thin ~~seal~~ sheet.
- * It requires a ~~distribution~~ system of distribution channel for the supply of water for flooding.
- * Higher rate of vertical infiltration is obtained on areas with undisturbed vegetation and sandy soil covering.
- * High infiltration rates can be obtained by selection of an area that is underlain by highly permeable sediments.

2. Basin OR Percolation tanks :-

- * This is the most common method for artificial recharge.
- * In this method water is impounded in series of basins or percolation tank.
- * The size of basin may depend upon the topography of area, in flatter area will have large basin.
- * This method is applicable in alluvial area as well as hard rock formation.
- * High infiltration rates can be obtained by -
 - a) Removal of suspended sediment in the recharge water.
 - b) maintenance of the highest possible water level in the basin.
 - c) Continuous ponding of water in the basin.
 - d) removal of organic material from the water and from the soil zone.
 - e) prevention of the growth of aquatic plants and algae in the basin.

3. Modification of natural channels :-

- * Seepage from natural streams or rivers is one of the most important source of recharge of the ground water reservoir.

- * When total water supply available in a stream/river exceeds the rate of infiltration, the excess is lost as run off.
- * This run off can be arrested through check bunds thus larger area is available to spread the river water increasing the infiltration.
- * The site selected for check dam should have sufficient thickness of permeable bed to facilitate recharge of stored water within short span of time.
- * The water stored in these structures is mostly confined to stream course and height is normally less than 2 m.

4. Ditching System :-

- * In areas with irregular topography, ditches provide max. water contact area for recharge.
- * This technique consists of a system of shallow flat bottomed and closely spaced ditches which are used to carry water from source like stream/canals and provide more percolation opportunity.
- * This technique require less soil preparation and is less sensitive to silting.

Sub-Surface method :-

In this method the structure lies below the surface and recharges ground water directly.

The important structures commonly use are Recharge wells and Recharge shafts.

I Recharge wells :-

Recharge wells can be of

two types

- a) Injection well — where water is pumped in for recharge
- b) Recharge well — where water flows under gravity.

Injection well —

- * The injection wells are similar to a tube well.
- * This technique is suitable for augmenting the ground water storage of deeper aquifers by "pumping in" treated surface water.
- * These wells can be used as pumping wells during summers.
- * The method is suitable to recharge single aquifer or multiple aquifers.
- * The recharge through this technique is comparatively costlier and required specialized technique.

Recharge well :-

- * The recharge well for shallow water table aquifer upto 50 m are cost effective because recharge can take place under gravity flow only.
- * These wells could be of two types, one is dry and another is wet.
- * The dry types of wells have bottom of screen above the water table.
- * The wet-type of wells are the wells in which screen is kept below water table. These wet type wells have been found more successful.

Pits / Shafts :-

- * In area where impervious layer is encountered at shallow depth the pits and shafts are suitable structure for artificial recharge.
- * These structures are cost effective to recharge the aquifer directly.
- * The diameter of the shaft/pit should normally be more than 2 m to accommodate more water.
- * The advantage of shafts/pits structure is that they do not require large piece of land like other spreading method.
- * There are practically no losses of water in form of soil moisture and evaporation like other methods of spreading.

Induced Infiltration method :-

- * It is an indirect method of artificial recharge involving pumping from aquifer hydraulically connected with surface water such as stream, canals and lakes.
- * In this method water table gradient is increased from source of recharge.
- * In this method special type of wells are constructed near the banks of river having radial collector.
- * The heavy pumping lowers the ground water level and cone of depression is created.
- * Lowering of water level induces the surface water to replenish the ground water.
- * This method is effective where stream bed is connected to aquifer by sandy formation.