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GROUNDWATER RECHARGING

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Abstract

This project report deals with study and development of Ground water recharging. We define Ground water recharging as hydrologic process where water moves downward from surface water to groundwater. The net effect is obtained to increase recharge to pre-urbanization rates or higher in climates and cities with high densities and large imported water supplies. In this report we focus on improving the new technologies for charging the ground water. We are using smart technologies which will improve the water table.

Index Terms: *Charging the ground water*

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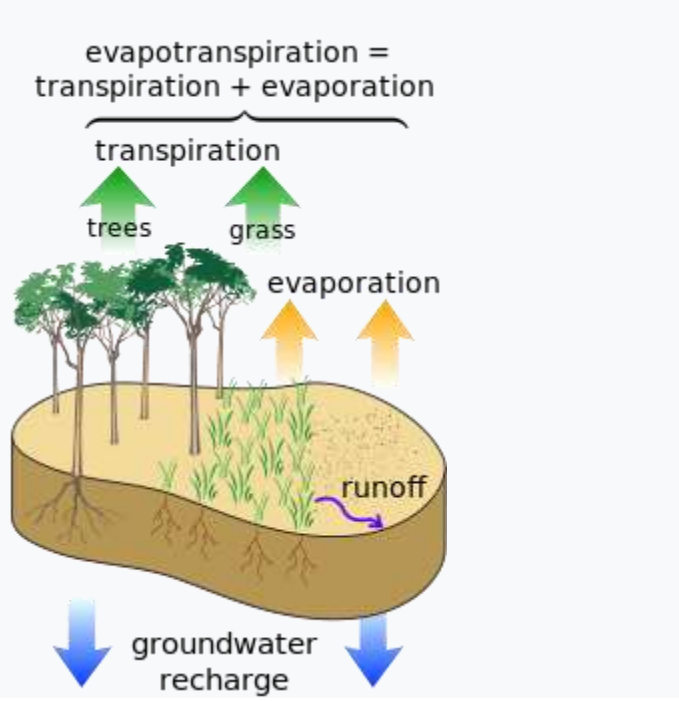
Groundwater recharge



Groundwater recharge or **deep drainage** or **deep percolation** is hydrologic process where water moves downward from surface water to groundwater. Recharge is the primary method through which water enters an aquifer. This process usually occurs in the vadose zone below plant roots and is often expressed as a flux to the water table surface. Recharge occurs both naturally (through the water cycle) and through anthropogenic processes (i.e., "artificial groundwater recharge"), where rainwater and or reclaimed water is routed to the subsurface.

1.2 Processes

Groundwater is recharged naturally by rain and snow melt and to a smaller extent by surface water (rivers and lakes). Recharge may be impeded somewhat by human activities including paving, development, or logging. These activities can result in loss of topsoil resulting in reduced water infiltration, enhanced surface runoff and reduction in recharge.

i. **Wetlands**
ii. **Depression-focused recharge**
iii. **Depression pressure**
iv. **Pollution**

Adverse factors

- Drainage
- Impervious surfaces
- Soil compaction
- Groundwater pollution

1. What is artificial recharge of ground water?

- Artificial recharge is the process whereby subsurface water is transferred underground to be stored in an aquifer. The most common method used involves injection water into boreholes and transferring water into spreading basin where it infiltrates the subsurface. Underground water storage is an efficient way to store water because it is not vulnerable to

evaporation losses and it is relatively safe from contamination. A variety of methods have been developed and applied to artificially recharge groundwater reservoirs in various parts of the world. Details of these methods, as well as related topics, can be found in the literature (e.g., Todd, 1980; Huisman and Olsthoorn, 1983; Asano, 1985; CGWB, 1994). The methods may be generally classified in the following four categories (Oaks ford, 1985):

a) Direct Surface Recharge Technique (ASANO, 1985).
b) Direct Subsurface Recharge Technique.
c) Combination surface-subsurface methods, including subsurface drainage (collectors with wells), basins with pits, shafts, and wells.
d) Indirect Recharge Techniques.

- Direct surface recharge techniques are among the simplest and most widely applied methods. In this method, water moves from the land surface to the aquifer by means of percolation through the soil. Most of the existing large scale artificial recharge schemes in western countries make use of this technique which typically employs infiltration basins to enhance the natural percolation of water into the subsurface. These methods have relatively low construction costs and are easy to operate and maintain. Direct subsurface recharge techniques convey water directly into an aquifer.
- Direct subsurface recharge methods access deeper aquifers and require less land than the direct surface recharge methods, but are more expensive to construct and maintain. Recharge wells, commonly called injection wells, are generally used to replenish groundwater when aquifers are deep and separated from the land surface by materials of low permeability. All the subsurface methods are susceptible to clogging by suspended solids, biological activity or chemical impurities.
- Combinations of several direct surface and subsurface techniques can be used in conjunction with one another to meet specific recharge needs.

Indirect methods of artificial recharge include the installation of groundwater pumping facilities or infiltration galleries near hydraulically-connected surface water bodies (such as streams or lakes) to lower groundwater levels and induce infiltration elsewhere in the drainage basin, and modification of aquifers or construction of new aquifers to enhance or create groundwater reserves. The effectiveness of the former, induced recharge method depends upon the number and proximity of surface water bodies, the hydraulic conductivity (or transmissivity) of the aquifer, the area and permeability of the streambed or lake bottom, and the hydraulic gradient created by pumping

2. WAYS TO PROTECT AND CONSERVE GROUNDWATER

a) Go Native
b) Reduce Chemical Use
c) Manage Waste
d) Don't Let It Run
e) Fix the Drip
f) Wash Smarter
g) Water Wisely
h) Reduce, Reuse, and Recycle
i) Natural Alternatives
j) Learn and Do More!

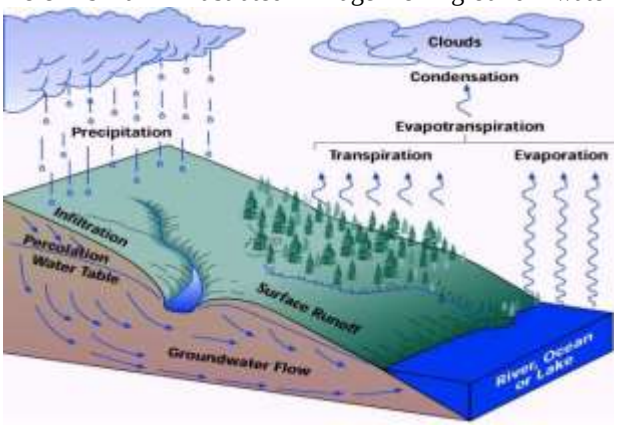
3. How does underground water replenish ?

Groundwater is replenished by rain.

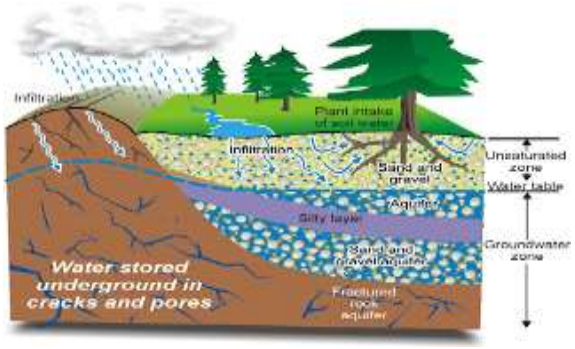
Explanation:

As part of the water cycle, rain falls from clouds. This rain seeps into the ground and becomes groundwater in the water table.

Here is an illustrated image of ground watercycle.



4. How to Recharge Ground Water and Prevent Contamination?



To overcome this scarcity of water we have to devise various low cost methods to recharge groundwater. Artificial recharge is the process by which the ground water reservoir is affected through increased infiltration of water by artificial structures and innovative methods.

Rainfall is the main source of ground water recharge. Other sources include recharge from rivers, streams, irrigation water etc. Rainfall is limited for a fixed duration; natural recharge of ground water is restricted to a particular period only. Since we cannot depend on rains to recharge ground water we have to adapt artificial Methods that are low in cost, and easy to use.

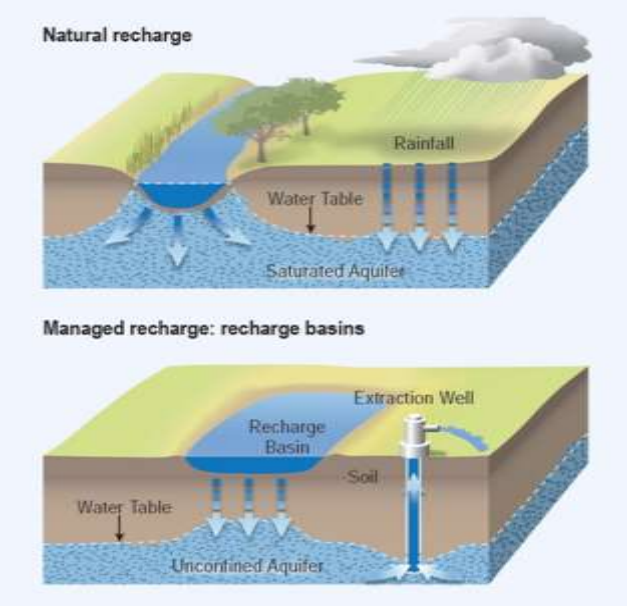
i. **Grey water treatment system**.
ii. **Rain Water Harvesting Method.**
iii. **Recharge by Dug well Method.**
iv. **Artificial recharge through unused drainage canals.**
v. **(a). Modification of Irrigation Techniques to Recharge Ground Water.**
(b). Clay Pot or Pitcher Irrigation Technique to Recharge Ground Water.
vi. **Rain garden to recharge ground water.**
vii. **Phytoremediation to recharge Ground water.**

5. How do you recharge an aquifer?

There are two types of aquifer recharge (AR):

1 - Natural recharge

2 - Artificial aquifer recharge.



Natural recharge is precipitation, river bed seepage, flooding and other natural forms of water that enter the groundwater system. Artificial aquifer recharge is the enhancement of natural groundwater supplies using man-made conveyances such as infiltration basins, field flooding, infiltration galleries or injection wells. Often, AR is conducted to improve groundwater resources (i.e. increasing storage) and is often incorporated into a broader water resource plan.

6. CONCLUSION

Thus it can be concluded that artificial recharge gives the reduction of runoff, increased availability of ground water especially in summer month, increased in irrigation revival of springs, improvement in ground water quality. This seminar will be helpful in future, while facing the different problems related to ground water recharge

7. REFERANCE:-

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