



Techniques for rainwater harvesting, purification and artificial groundwater recharge

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SUMMARY

In India, several regions suffer from water scarcity and contamination. The infiltration and subsurface storage of rain and river water can reduce water stress. Artificial groundwater recharge, possibly combined with bank filtration, plant purification and/or the use of subsurface dams and artificial aquifers, is especially advantageous in areas where layers of gravel and sand exist below the earth's surface. Artificial infiltration of surface water into the uppermost aquifer has qualitative and quantitative advantages. The contamination of infiltrated river water will be reduced by natural attenuation. Clay minerals, iron hydroxide and humic matter as well as microorganisms located in the subsurface have high decontamination capacities. By this, a final water treatment, if necessary, becomes much easier and cheaper. The quantitative effect concerns the seasonally changing river discharge that influences the possibility of water extraction for drinking water purposes. Such changes can be equalised by seasonally adapted infiltration/extraction of water in/out of the aquifer according to the river discharge and the water need. This method enables a continuous water supply over the whole year. Generally, artificially recharged groundwater is better protected against pollution than surface water, and the delimitation of water protection zones makes it even more save.

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The growing population and an increase of industrialization and agricultural production in our countries require more and more water of adequate quality. In many regions there is a lack of surface water and severe water contamination is to be found. Shallow groundwater resources are often of insufficient quality and over-exploited. Therefore, it is of high priority to take into consideration all the proved water techniques that could help to reduce the existing disaster.

Artificial groundwater recharge is an approved method that has been improved during the last decades. It has been found that also the new kinds of polluting agents, especially organic compounds, can be minimized or even removed by natural purification processes in the subsurface.

Artificial ground water recharge :

In order to increase the quantity of water stored in subsurface and improve quality of subsurface water by

process of natural attenuation, can be done through artificial ground water recharge. Artificial ground recharge is the technique in which the infiltration of surface water collected from rainfall into shallow aquifer to increase the subsurface ground water (Balke *et al.*, 2000).

This technique can be used for river valleys and sedimentary plains by infiltration of river or lake water into the shallow sand and gravel layers. The infiltration technique can be selected based on hydro geological conditions, the available ground space, water requirement, the composition of water to be infiltrate and the degree of purification to be achieved (Schmidt, 1980; Schmidt and Balke, 1980; 1985). Artificial groundwater recharge, combined with pre-treatment, bank filtration, plant purification, subsurface dams and artificial aquifers can be used to improve the efficiency of purification process of rainwater (Balke *et al.*, 2000; Preu and Schulte-Ebbert, 2000).

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