

## **GROUNDWATER RECHARGE POTENTIAL IN PUNJAB**

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The state of Punjab is occupied by Indus river basin and is drained by three major rivers, the Ravi, the Beas and the Satluj along with other drainage channels. About 90% of the area is occupied by Quaternary alluvium and Tertiary formations outcrop as Siwalik hills ranges in northeastern part of the State.

Ground water exploration reveals existence of thick fresh water aquifers throughout the State. These aquifers are laterally and vertically extensive and persistent in nature except in southwestern part which is underlain by brackish / saline water.

In recent past ground water levels have declined rapidly due to various reasons and area under paddy crop has also increased along with increase in number of tubewells.

Central Ground Water Board has prepared National Perspective Plan for Recharge to Ground Water by Utilizing Surplus Monsoon Runoff (1996), Master Plan for Artificial Recharge to Ground Water (2002) and Revised Master Plan for Artificial Recharge to Ground Water (2008)

The present Ground water resources of state have been estimated as on 31.03.2017. The Net annual ground water availability of state has been assessed to be 21.65 BCM. Net annual draft of the state has been estimated to be 35.81 BCM. The average stage of ground water development in the state is 165 %. Out of 138 blocks assessed, 110 falls under 'Over exploited' category, 4 in 'critical', 3 as 'Semi critical' and 26 as 'safe' category. The reason for this stage of ground water development are excessive withdrawal of ground water mainly to meet growing demands of agriculture. Surface water resources in the state are limited and are decreasing due to climate change. Thus stress is more and more on ground water. These over-exploited aquifers require augmentation for sustaining the ground water abstraction structures.

Based on the post monsoon depth to water level and long term ground water level trends, it has been estimated that 43,340 sq. kms. area is feasible for artificial recharge in Punjab. Further it is estimated that volume of unsaturated zone up to 3 m bgl is 52,684 MCM. A total of 70,071 MCM of surface water is required in the state for artificial recharge. However the quantity of non-committed surplus surface water in the Punjab state has been estimated to be only 1200.99 MCM against the requirement of 70,071 MCM.

The main recharge structures feasible in the state are recharge shaft, horizontal trench with or without injection wells and check dams. It has been estimated that 79,924 artificial structures are required to recharge the available surplus water in the state. The district wise number of structures feasible and cost estimates is given in table-1.

The impact of artificial recharge to ground water will be maximum during post monsoon period and a distinct rise in ground water level will be observed in the recharge area as compared to area not receiving the additional recharge. It is estimated that influence of recharge scheme as proposed in

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Master Plan will be observed in about 26650 Sq. Km. area and it will help to check in decline in water level. This will result in saving of energy, due to reduction in pumping lift.

It has also been assessed that roof top rainwater harvesting can be adopted in 15 lakh houses, govt buildings, institutes etc. in urban and municipal area of the state suitable for artificial recharge in the first phase. It will harness 187 MCM rain water to augment groundwater resources considering normal rainfall for the state and 80% efficiency of the system.

Central ground Water Board, NWR has implemented 20 pilot projects for artificial charge to ground water in Punjab in association with state Govt. These projects involves, artificial recharge to ground water by utilizing surplus monsoon runoff in drains, using Sarover Water in Golden Temple, Rooftop rain water harvesting, surplus canal water etc through various recharge structures.

During recent studies carried out under National Aquifer Mapping and Management Project for Punjab state, aquifers upto depth of 300 m has been identified and block wise demarcated. This will help in calculating actual thickness of de-saturated aquifers in the state for artificial recharge to ground water.