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ENVIS CENTRE, CHANDIGARH

# NewsLetter

Paryavaran - Patra

## Chandigarh State of Environment

Groundwater Series Vol 1

### Year wise Construction of Dams

| Year | Silt Retention Dam | Masonry Check Dam | Desiltation of Dams |
|---|---|---|---|
| 2004-2005 | 2 | 5 | 10 |
| 2005-2006 | 3 | 10 | 6 |
| 2006-2007 | 2 | 6 | 10 |
| 2007 2008 | 3 | 10 | 7 |
| 2008 2009 | 3 | 10 | 10 |
| 2009-2010 | 2 | 10 | 6 |

Conservator, Forests, Chandigarh

## EDITORIAL


Bade Pathran Wala Dam

Chandigarh has the advantage of its location, being situated in foothills of Shivalik and having lush green cover, which collectively makes Chandigarh, a best habitat to live in. Like many other parts of India, Chandigarh also receives rainfall mostly during monsoon season. This situation makes it urgent to take steps to conserve rain water as much as we can. Engineering Department of UT and Central Ground water Board, Chandigarh has built up rain water harvesting systems in Chandigarh. The Forest Department of Chandigarh has constructed 192 water bodies in the forests of Chandigarh which not only conserve the water for the wildlife but also enrich underground water table and increase the possibility of rain by providing surface water for evaporation. Taking one step further, to conserve soil and moisture, number of silt retention dams have been constructed and desiltation of the silted up dams have been carried under the scheme 'Forest conservation and Development'.

Director, Environment

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## GROUND WATER

Many of the common people consider groundwater as rivers flowing under the surface. In contrast to the theory groundwater fills the cracks and pores found in rocks and sediments beneath the surface of earth. The groundwater is counted naturally clean and free from pollution due to protected location of its presence. Ground water is often used to irrigate the fields. Other uses of ground water include drinking purpose and industrial use. The study of the distribution and movement of groundwater is groundwater hydrogeology.

Groundwater also includes soil moisture, permafrost (frozen soil), immobile water in very low permeability bedrock, and deep geothermal or oil formation water.

**Location of Groundwater**

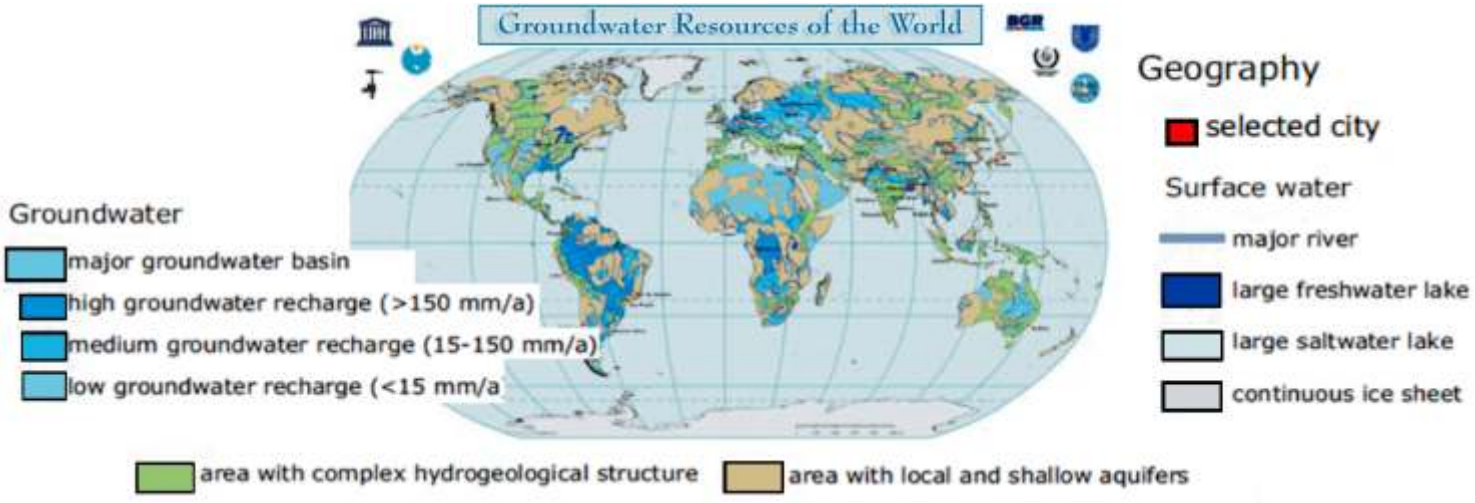
Ground water is stored in layers of soil, sand, and rocks beneath the surface of earth. Such permeable resources are known as Aquifers. The movements of water in Aquifer depend on the available space and connectivity to next Aquifer. The source of recharge and eventual outlet is surface water.

Groundwater is recharged from, and eventually flows to, the surface naturally; natural discharge often occurs at springs and seeps, and can form oases or wetlands. Groundwater is also often withdrawn for agricultural, municipal and industrial use by constructing and operating extraction wells. The study of the distribution and movement of groundwater is hydrogeology, also called groundwater hydrology.

**Importance of groundwater**

In the rural areas of India, 50% of requirements of water for irrigation are met by groundwater. 85% of domestic requirements are satisfied by Groundwater. It is important ecologically. Rivers, wetlands, and lakes are fed by groundwater. Thousands of people in India use groundwater for drinking purposes. It is used to irrigate the fields and produce the food grains.

## THE FRESH WATER RESOURCES OF THE EARTH (AFTER UNESCO 2003)




Special Edition 2004, extracted from World-wide Hydrogeological Mapping and Assessment Programme (WHYMAP)

Though available in abundance, groundwater scarcity and pollution is cause of concern for many nations including India where ground water usage or misusage is higher than the recharging of the resource of groundwater.

## STATE-WISE GROUND WATER RESOURCES AVAILABILITY, UTILIZATION AND STAGE OF DEVELOPMENT

*(in bcm/yr)*

| States / Union Territories | Annual Replenishable Ground Water Resource | | | | | Natural Discharge During non-monsoon season | Net Annual Ground Water Availability | Annual Ground Water Draft | | | Projected Demand for Domestic and Industrial uses upto 2025 | Ground Water Availability for future irrigation | Stage of Ground Water Development (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Monsoon Season | | Non-monsoon Season | | Total | | | Irrigation | Domestic and industrial uses | Total | | | |
| | Recharge from rainfall | Recharge from other sources | Recharge from rainfall | Recharge from other sources | | | | | | | | | |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **States** | | | | | | | | | | | | | |
| Delhi | 0.13 | 0.06 | 0.02 | 0.09 | 0.30 | 0.02 | 0.28 | 0.20 | 0.28 | 0.48 | 0.57 | 0.00 | 170 |
| Haryana | 3.52 | 2.15 | 0.92 | 2.72 | 9.31 | 0.68 | 8.63 | 9.10 | 0.35 | 9.45 | 0.60 | -1.07 | 109 |
| Himachal Pradesh | 0.33 | 0.01 | 0.08 | 0.02 | 0.43 | 0.04 | 0.39 | 0.09 | 0.02 | 0.12 | 0.04 | 0.25 | 30 |
| Punjab | 5.98 | 10.91 | 1.36 | 5.54 | 23.78 | 2.33 | 21.44 | 30.34 | 0.83 | 31.16 | 1.00 | -9.89 | 145 |
| **Union Territories** | | | | | | | | | | | | | |
| Andaman & Nicobar | - | - | - | - | 0.330 | 0.005 | 0.320 | 0.000 | 0.010 | 0.010 | 0.008 | 0.303 | 4 |
| Chandigarh | 0.016 | 0.001 | 0.005 | 0.001 | 0.023 | 0.002 | 0.020 | 0.000 | 0.000 | 0.000 | 0.000 | 0.020 | 0 |
| Dadara & Nagar Haveli | 0.059 | 0.005 | | | 0.063 | 0.003 | 0.060 | 0.001 | 0.007 | 0.009 | 0.008 | 0.051 | 14 |
| Daman & Diu | 0.006 | 0.002 | 0.000 | 0.001 | 0.009 | 0.0004 | 0.008 | 0.007 | 0.002 | 0.009 | 0.003 | -0.002 | 107 |
| Lakshdweep | - | - | - | - | 0.012 | 0.009 | 0.004 | 0.000 | 0.002 | 0.002 | - | - | 63 |
| Pondicherry | 0.057 | 0.067 | 0.007 | 0.029 | 0.160 | 0.016 | 0.144 | 0.121 | 0.030 | 0.151 | 0.031 | -0.008 | 105 |
| **Total Uts** | **0.138** | **0.075** | **0.012** | **0.031** | **0.597** | **0.036** | **0.556** | **0.129** | **0.051** | **0.181** | **0.050** | **0.365** | **33** |

## GROUNDWATER RESOURCES AND EXPLORATION IN PUNJAB

| Dynamic Resources | |
|---|---|
| Annual Replenishable Ground water Resource | 23.78 BCM |
| Net Annual Ground Water Availability | 21.44 BCM |
| Annual Ground Water Draft | 31.16 BCM |
| Stage of Ground Water Development | 145 % |

Situation of groundwater is alarming in Punjab. 5 blocks have already acquired critical status and 4 blocks have semi-critical status. Many parts of the states have polluted groundwater which is not safe for drinking purpose.

| Developmental Monitoring | |
|---|---|
| Over Exploited | 103 Blocks |
| Critical | 5 Blocks |
| Semi- critical | 4 Blocks |
| Exploratory Tube wells Constructed (as on 31.03.2009) | 184 |
| No. of ground water observation wells | 261 |

Ministry of water resources, India

## STATE WISE STATUS OF BORE HOLES DRILLED BY CGWB (As on 31.03.2008)

| STATE | EW | | OW | PZ | SH | TOTAL | DW | TOTAL |
|---|---|---|---|---|---|---|---|---|
| | (Dept) | (Cont) | | | | | | |
| Haryana | 363 | 7 | 242 | 174 | 23 | 809 | 170 | 979 |
| Himachal Pradesh | 162 | | 11 | 2 | 1 | 176 | 0 | 176 |
| Punjab | 159 | | 172 | 81 | 20 | 432 | 14 | 446 |
| | UNION TERRITORIES | | | | | | | |
| Chandigarh | 7 | 0 | 17 | 14 | 2 | 40 | 15 | 55 |
| Delhi | 139 | 0 | 59 | 136 | 13 | 347 | 380 | 727 |
| **GRAND TOTAL** | **12522** | **2146** | **5782** | **3142** | **360** | **23952** | **3635** | **27587** |

**EW - Exploratory Well** **OW- Observation Well** **PZ - Piezometer**

**SH - Slim Hole** **DW - Deposit Well** **Dept: Departmental** **Cont: Contractual**

**Note: Successful Exploratory wells as per Government of India policy have been handed over to the beneficiary state government agencies free of cost.**

## STATE WISE ASSESSMENT OF BOREHOLES

| States / Union Territories | Total No. of Assessed | Safe | | Semi-critical | | Critical | | Over-Exploited | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Nos. | % | Nos. | % | Nos. | % | Nos. | % | |
| **States** | | | | | | | | | | |
| Delhi | 9 | 2 | 22 | 0 | 0 | 0 | 0 | 7 | 78 | - |
| Himachal Pradesh | 5 | 5 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Punjab | 137 | 25 | 18 | 4 | 3 | 5 | 4 | 103 | 75 | - |
| Haryana | 113 | 42 | 37 | 5 | 4 | 11 | 10 | 55 | 49 | - |
| **Union Territories** | | | | | | | | | | |
| Chandigarh | 1 | 1 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | |
| **Total Uts** | **18** | **11** | **61** | **4** | **22** | **0** | **0** | **2** | **11** | **-** |
| **Grand Total** | **5723** | **4078** | **71** | **550** | **10** | **226** | **4** | **839** | **15** | **-** |

Data indicates that 78% of assessed ground water resources are over-exploited in Delhi and 75% in Punjab. Chandigarh has 0 over-exploited resource as there is negligible agriculture. Central Ground Water Board, located in sector 27, Chandigarh, mainly looks after the ground water related issues in Chandigarh. Chandigarh Pollution Control Committee contributes by sample testing. Most of the ground water is safe to use in Chandigarh except a few shallow aquifers where iron contents more than 1.0 mg/l have been observed, which is not suitable for domestic purposes. The suitability for use of groundwater in Chandigarh for irrigation is evaluated by CGWB, Chandigarh which has found that the use of ground water in Chandigarh for irrigation may cause medium salinity hazards to salt sensitive crops & low sodium hazard on soil with low permeability. However, ground water in Chandigarh is suitable for customary irrigation to salt tolerant crops grown on soils of medium permeability. Analysis of trace elements in ground water indicated that concentration of copper, iron and manganese in some of the shallow hand pump waters is above maximum permissible limit for drinking waters.

## HYDROLOGY, CHANDIGARH

| | WELLS FEASIBLE | RIGS SUITABLE | DEPTH OF WELL ( m ) | DISCHARGE ( lpm ) | SUITABLE ARTIFICIAL RECHARGE STRUCTURES |
|---|---|---|---|---|---|
| Soft Rock Aquifer | Tube Wells | Reverse / Direct Rotary | 25 - 400 | 300 - 1000 | Recharge Trench with Injection Well |
| Soft Rock Aquifer | Tube Wells | Percussion / Odex | 100 - 300 | More than 500 | Recharge Trench with Injection Well |

Electrical Conductivity ( Micromhos / Cm at 25°C )

3.43 ● Iron more than permissible limit ( 1.0 mg / l )


GROUND WATER MONITORING STATION

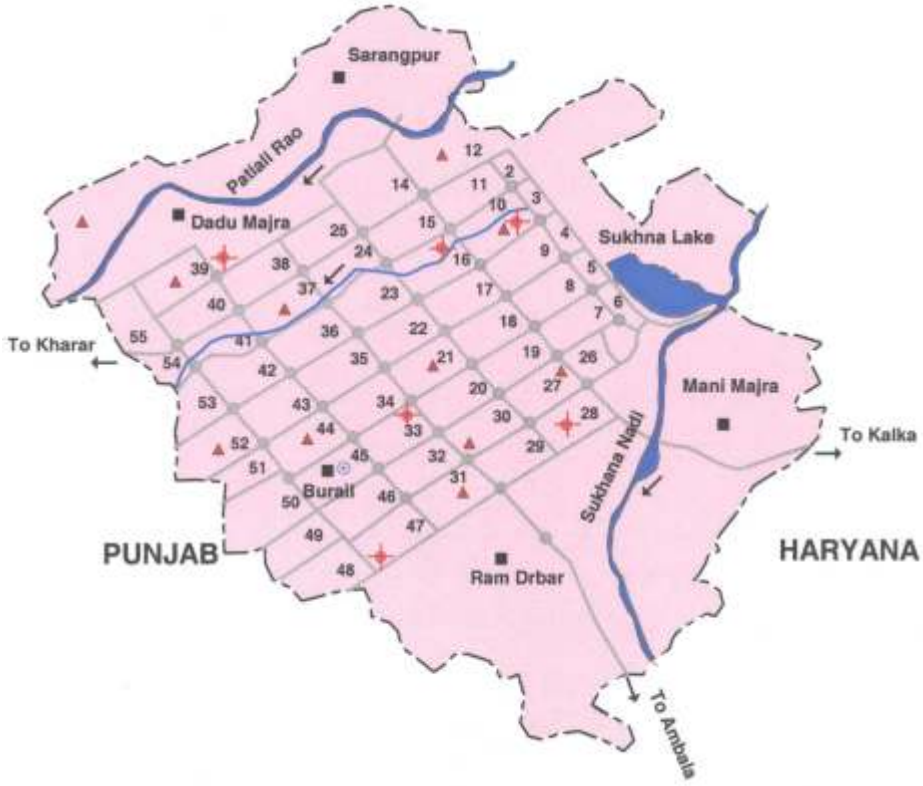
EXPLORATORY WELL

PIEZOMETER

LOCATION OF VILLAGE

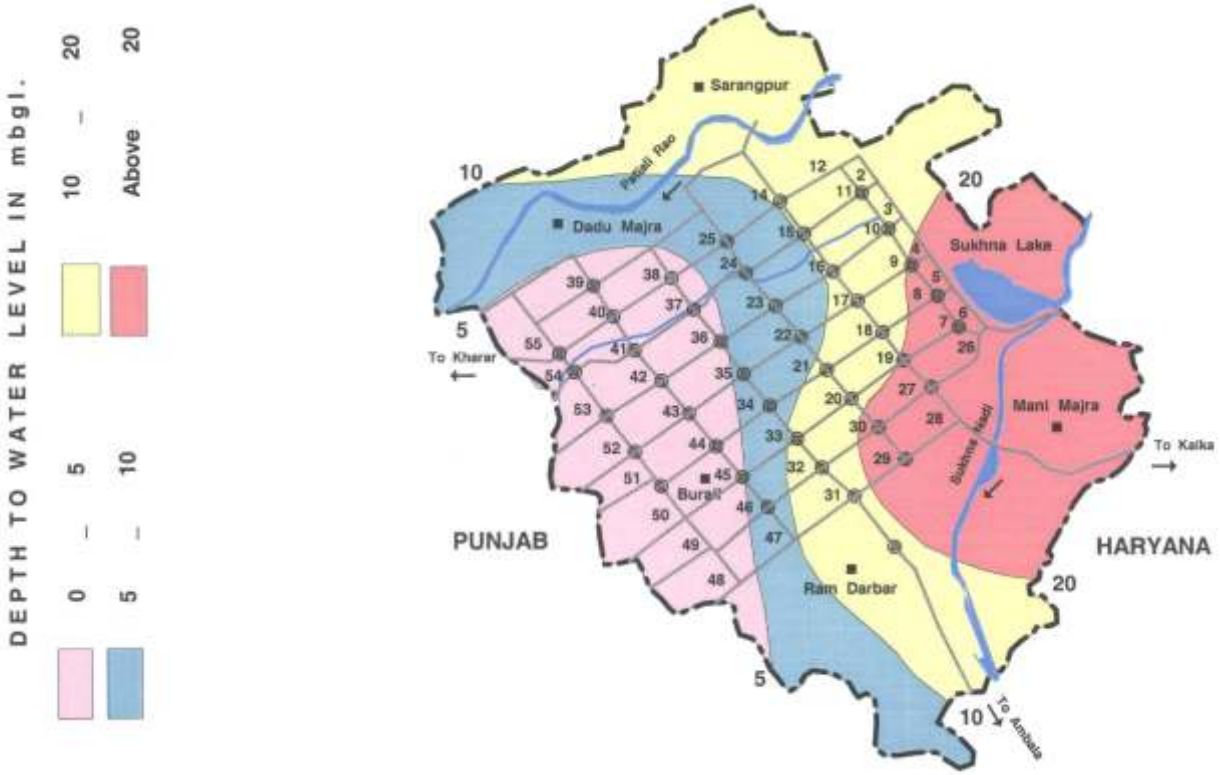
U . T. BOUNDARY

ROAD

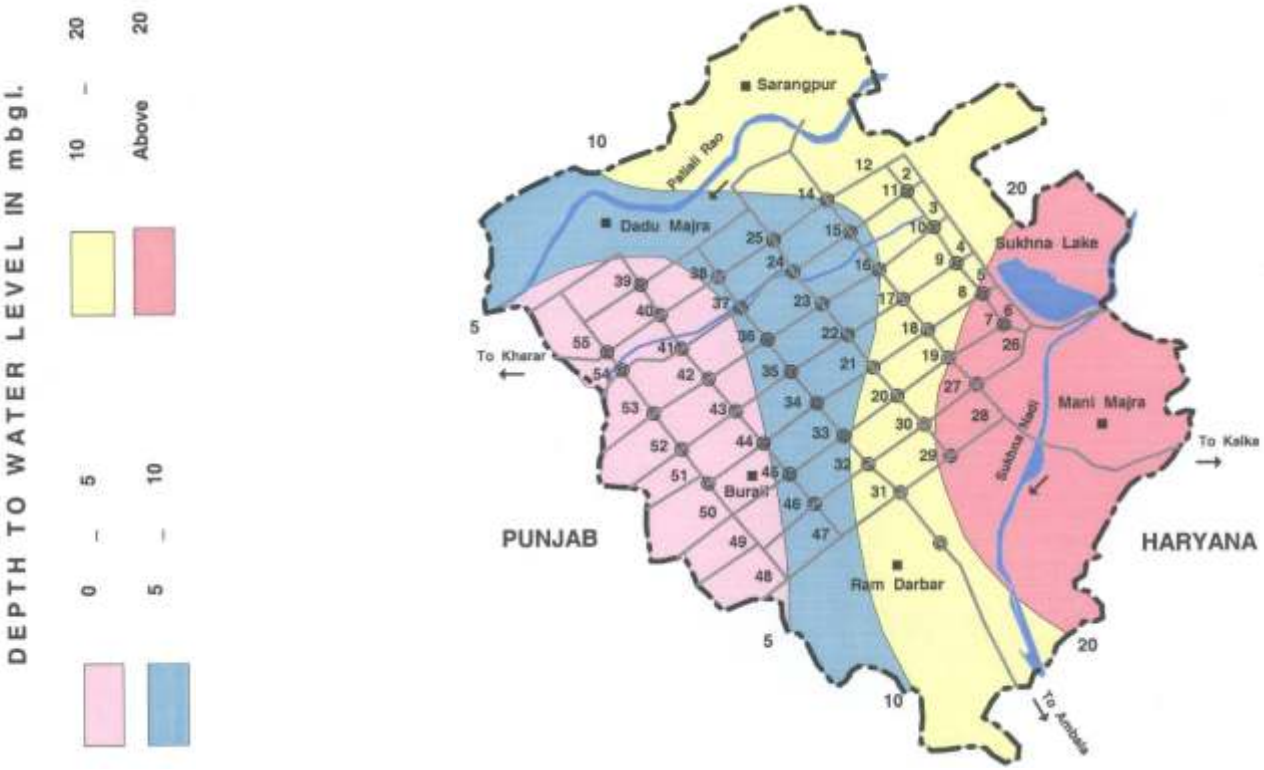



Central Ground Water Board, Chandigarh

## DEPTH TO WATER LEVEL: SHALLOW AQUIFER (PRE MONSOON)




## DEPTH TO WATER LEVEL: SHALLOW AQUIFER POST MONSOON)




Central Ground Water Board, Chandigarh

**Dear Information Seeker,**


ENVIS CENTRE, Chandigarh furnishes you with the services to collect and disseminate information related to environment of Chandigarh. To share information with us you are requested to fill up the form given below.

Your feedback is valuable to us and will be highly appreciated

- Name _____
- Designation _____
- Department _____
- Address _____

_____ City _____

- State _____ Country _____ Pin |_|_|_|_|_|_|
- Phone _____ Fax _____
- Email _____

**Your views on scope of improvement :**

- Interest Area _____

I would like to have information on following :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# At the End of...

ENVIS CENTRE, CHANDIGARH
Newsletter
Paryavaran-Patra

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**Mrs. Shikha Aggarwal**
(Web Assistant)

**Mr. Surinder Kumar**
(Data Entry Operator)

## FACTS

The depletion of groundwater throughout the country is a matter of grave concern. We should make all out the efforts to conserve rain water:

- The ground water in 75% of total geographical area of the state is over exploited in terms of stage of ground water development, as exploitation is more than 100 percent,
- 7% area of the state is under the category of critical and semi critical category
- 18 % area of the state is safe for ground water development and only a part of this is in Kandi area zone. The rest is in south western Punjab and is saline and unfit for use.

## TECHNICAL TERMS

**Aquifer:** Aquifer is geological formation which is able to store and yield water beneath the earth's surface

**Discharge:** Discharge is outflow of water in any form like stream or watershed

**Recharge:** Recharge is addition of water to water table

**Hydrologic cycle:** Water completes a cyclic movement by phenomena like discharge, evaporation, precipitation, and then entering again the water table recharging it.

impermeable layer: Impermeable layer is a layer of soil which do not permit the movement of water

**saturation zone:** Saturation zone is the portion below the earth's surface that is saturated with water is called the zone of saturation. The upper surface of this zone, open to atmospheric pressure, is known as the water table

**unconfined aquifer:** unconfined aquifer is an aquifer containing groundwater, that has an impermeable layer below but not above it; a confined aquifer is groundwater between two layers of impermeable clay or rock

**water table:** water table is the top of an unconfined aquifer; indicates level below which soil and rock are saturated with water

SPO, ENVIS

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