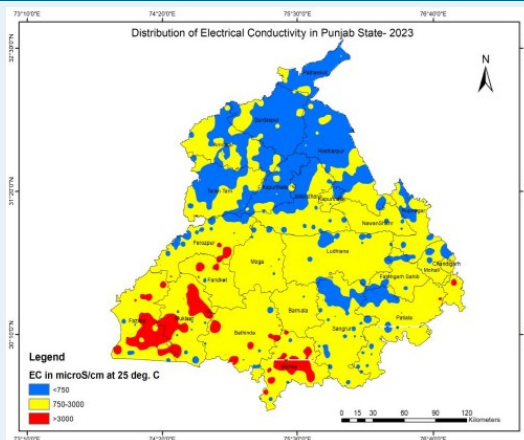


## Groundwater Quality Scenario in Punjab

Parameters	No of samples	Permissible limit	No. of Samples above permissible limit	% Samples above permissible Limit
EC	922	3000 $\mu\text{S}/\text{cm}$	62	6.72
Fluoride	922	1.5 mg/L	127	13.77
Nitrate	922	45 mg/L	116	12.58
Arsenic	908	10 ppb	44	4.85
Uranium	908	30 ppb	296	32.6



### Districts with anomalous values at sporadic locations

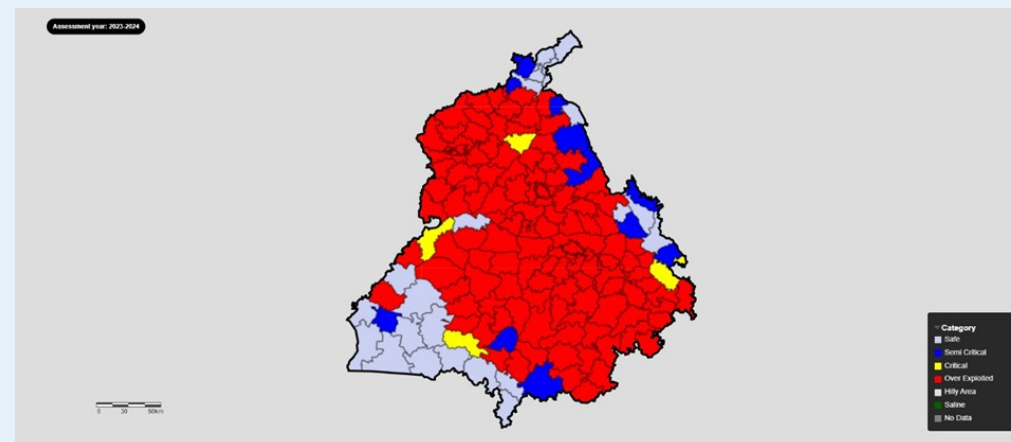
<b>EC (3000 <math>\mu\text{S}/\text{cm}</math>)</b>	Bathinda, Faridkot, Fazilka, Ferozepur, Mansa, Muktsar, Nawanshahr, Patiala, Sas Nagar
<b>Fluoride (<math>F &gt; 1.5</math> mg/L)</b>	Amritsar, Bathinda, Faridkot, Fatehgarh Sahib, Fazilka, Ferozepur, Gurdaspur, Hoshiarpur, Jalandhar, Mansa, Moga, Muktsar, Nawanshahr, Patiala, Sangrur, SAS Nagar, Tarn Taran
<b>Nitrate (Nitrate <math>&gt; 45</math> mg/L)</b>	Amritsar, Barnala, Bathinda, Faridkot, Fazilka, Ferozepur, Gurdaspur, Hoshiarpur, Jalandhar, Ludhiana, Mansa, Moga, Muktsar, Nawanshahr, Pathankot, Patiala, Rupnagar, Sangrur, Sas Nagar, Tarn Taran
<b>Arsenic (<math>As &gt; 10</math> ppb)</b>	Amritsar, Fazilka, Ferozepur, Gurdaspur, Hoshiarpur, Kapurthala, Muktsar, Pathankot, Patiala, Rupnagar, Sas Nagar, Tarn Taran
<b>Uranium (<math>U &gt; 30</math> ppb)</b>	Amritsar, Barnala, Bathinda, Faridkot, Fatehgarh Sahib, Fazilka, Ferozepur, Gurdaspur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana, Mansa, Moga, Muktsar, Nawanshahr, Patiala, Rupnagar, Sangrur, Tarn Taran

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Central Ground Water Board  
Department of Water Resources, RD & GR  
Ministry of Jal Shakti, Government of India



Dynamic Ground Water Resources &  
Ground Water Quality of Punjab, 2024

December, 2024

## Groundwater Resource Scenario in Punjab

- ◆ Ground Water Resources Assessment (GWRA)- jointly carried out by Central Ground Water Board and State Nodal/Ground Water Department periodically as per the Ground Water Resource Estimation Committee (GEC) methodology.
- ◆ Carried out under the guidance of the respective State/UT Level Committees (SLCs) and overall supervision of Central Level Expert Group (CLEG).
- ◆ As part of the assessment, 'Annual Extractable Ground Water Resource' as well as 'Annual Ground Water Extraction are assessed for each assessment unit (Block).
- ◆ The 'Stage of Ground Water Extraction' is computed as the ratio of 'Annual Ground Water Extraction' with respect to 'Annual Extractable Ground Water Resource' and is usually expressed in percentage. Based on the stage of extraction, the assessment units are categorized as Safe ( $\leq 70\%$ ), Semi-Critical ( $>70\%$  and  $\leq 90\%$ ), Critical ( $>90\%$  and  $\leq 100\%$ ) and Over-Exploited ( $>100\%$ ).
- ◆ GWRA-2024, 2023, 2022 and 2020 has been carried out through a software/web-based application "INDIA-GROUNDWATER RESOURCE ESTIMATION SYSTEM (IN-GRES)" developed by CGWB through IIT-Hyderabad.

### Salient Features

1	Rainfall	558.76 mm
2	Hydrogeology	Mainly occupied by Flat Alluvial Plain except thin belt of mountains along north eastern border and few patches of stable sand dunes in south western parts.
3	Recharge Worthy Area of the State	50.18 Thousand Sq. Km
4	Assessment Unit (AU) Type / Number	Block / 153 Numbers
5	Average area of Assessment Unit	327.94 Sq. Km

### Findings

	Attribute	GWRA-2017	GWRA-2020	GWRA-2022	GWRA-2023	GWRA-2024
1	Total Annual Ground Water Recharge (in bcm)	23.93	22.8	18.94	18.84	19.19
2	Annual Extractable Ground Water Resources (in bcm)	21.58	20.59	17.07	16.98	17.63
3	Annual Ground Water Extraction (in bcm)	35.78	33.85	28.02	27.8	27.66
4	Stage of Ground Water Extraction (in %)	165.77	164.42	164.11	163.76	156.87

bcm: Billion Cubic Meters

### Categorization of Assessment Units based on the 'Stage of Ground Water Extraction

Sl. No	Category	GWRA-2017		GWRA-2020		GWRA-2022		GWRA-2023		GWRA-2024	
		Number of AUs	% of AUs	Number of AUs	% of AUs	Number of AUs	% of AUs	Number of AUs	% of AUs	Number of AUs	% of AUs
1	Safe	22	16	17	11	17	11	20	13.07	22	14.38
2	Semi-critical	5	4	10	7	15	10	13	8.5	12	7.84
3	Critical	2	1	6	4	4	3	3	1.96	4	2.61
4	Over-exploited	109	79	117	78	117	76.47	117	76.47	115	75.16
5	Saline										
Total number of AUs		138		150		153		153		153	

### Recommendations

- \* The Punjab State is a flat alluvial plain having a thin belt of mountains along north eastern border and stable sand dunes are seen dotting the landscape in the south western parts. The alluvial deposits in the State comprise sand, silt and clays often mixed with kankar. Sandy zones of varying grade constitute abundant ground water resources & act as a reservoir. The alluvial plain towards the hills is bordered by the piedmont deposits comprising Kandi and Sirowal. Immediately south-west of the hills, Kandi belt is 10 to 15 km wide followed by Sirowal which imperceptibly merges with the alluvial plain. Kandi deposit explored up to 450 m depth show gradation from boulders to clays and at places an admixture of various grades in different proportions. The Sirowal deposit is essentially composed of finer sediments but occasional gravel beds are also encountered in them.
- \* Total Annual Ground Water Recharge of the State has been assessed as 19.19 bcm and Annual Extractable Ground Water Resource as 17.63 bcm. The Annual Ground Water Extraction is 27.66 bcm and Stage of Ground Water Extraction is 156.87 %.
- \* Out of total 153 assessment units including 3 urban areas taken for study, 115 assessment units (75.16%) i.e. 112 blocks and 3 urban areas have been categorized as 'Over-exploited', 04 blocks (2.61%) as 'Critical', 12 blocks (7.84%) as 'Semi Critical' and 22 blocks (14.38%) as 'Safe'.
- \* To aware and encourage farmers to diversify the paddy and other water guzzling crops by adapting Crop Diversification programmes launched in the State for conservation of natural groundwater resource, alternate crops e.g., maize, sunflower, cotton, vegetables, bajra and summer moong etc. are being promoted in place of water guzzling crops.
- \* The construction of Roof-Top Rain-Water Harvesting Structure (RTRWHS) should be made mandatory in all Govt. building including Schools/ Colleges/ Govt. offices for artificially recharging the groundwater aquifers and creating awareness among students and general public.
- \* Increase in irrigation efficiency through adopting of micro—irrigation techniques in more areas.
- \* To encourage the farmers to adopt micro irrigation systems such as Drip Irrigation System, Sprinkler Irrigation system, Mini sprinkler Irrigation system.
- \* To reduce seepage and evaporation losses, encourage the farmers to adopt Underground Pipeline System.
- \* National Aquifer Mapping & Management Programme (NAQUIM) Reports prepared by CGWB (<https://cgwb.gov.in/cgwbpm/>) which are also being shared with State/District Authorities and Ground Water Year Book published by CGWB having water level & water quality data may be used in Ground water management (<https://cgwb.gov.in/cgwbpm/>).
- \* State may review their free/subsidized electricity policy to farmers (if applicable), bring suitable water pricing policy and may work further towards crop rotation/diversification/other initiatives to reduce overdependence on groundwater.
- \* Regulation & control of Ground water Extraction: Ministry of Jal Shakti has issued the guidelines for control and regulations of ground water extraction vide notification dated 24.09.2020 which has further been amended in March 2023. Concerned departments may ensure implementations of the guidelines.