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## Water Quality Status of Uranthupalayam Dam, Uthukuli

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Water quality plays a decisive role in determining how surface water resources can be used for drinking and agriculture. In semi-arid regions, reservoirs often experience gradual changes in chemical composition due to high evaporation and limited rainfall. Uranthupalayam Dam, located in Uthukuli of Tiruppur District, Tamil Nadu, is one such important surface water source. A detailed analysis carried out on 28 January 2026 provides insight into the physicochemical characteristics of the dam water and its suitability for different uses.

### Study Area and Sampling Details

Uranthupalayam Dam serves as a supporting water source for irrigation in the surrounding agricultural lands of Uthukuli. The region experiences a warm climate with moderate to low rainfall, conditions that strongly influence water quality. The sample collected in January represents post-monsoon storage conditions, during which dissolved minerals tend to become concentrated due to reduced inflow and continued evaporation.

### Physicochemical Characteristics of Dam Water

Table 1. Key water quality parameters of Uranthupalayam Dam

Parameter	Value	Interpretation
pH	8.0	Slightly alkaline, within permissible limit
EC	3050 $\mu$ S/cm	High salinity
TDS	1958 mg/L	Very high
Total Hardness	580 mg/L	Very hard water
Calcium	77 mg/L	Within acceptable limit
Magnesium	56 mg/L	Acceptable
Sodium	285 mg/L	High
Potassium	0 mg/L	Negligible
Chloride	411 mg/L	Above permissible limit
Sulphate	173 mg/L	Within limit
Bicarbonate	274 mg/L	Moderate
Carbonate	0 mg/L	Absent
SAR	5.15	Low sodium hazard
RSC	0	Safe
Nitrate	39.99 mg/L	Near upper safe limit

The results show that the dam water is mineral-rich with high salinity and hardness. While individual calcium and magnesium levels remain within acceptable limits, their combined effect results in very hard water. Elevated chloride and dissolved solids contribute to reduced palatability and indicate strong evaporative concentration.

## Drinking Water Suitability Assessment

**Table 2. Drinking water suitability evaluation**

Criterion	Status
pH	Acceptable
Total Dissolved Solids	Exceeds permissible limit
Total Hardness	Very high
Chloride	Above permissible limit
Overall Drinking Suitability	Not suitable without treatment

From a drinking water perspective, the high total dissolved solids, hardness, and chloride content make the water unsuitable for direct consumption. Although the water is clear and free from visible contamination, long-term consumption without treatment may lead to health concerns and infrastructure scaling. Treatment methods such as reverse osmosis, desalination, or blending with low-salinity sources are therefore essential before domestic use.

## Irrigation Water Suitability and Implications

**Table 3. Irrigation water suitability classification**

Criterion	Assessment
Salinity Hazard (EC)	High
Sodium Hazard (SAR)	Low
Residual Sodium Carbonate	Safe
Overall Irrigation Suitability	Moderate to Poor

The irrigation assessment indicates that sodium-related soil problems are unlikely due to the low SAR and safe RSC values. However, the high salinity level poses a risk of salt accumulation in the root zone if the water is used continuously without management. The water is better suited for salt-tolerant crops grown in well-drained soils, where periodic leaching and proper irrigation practices can minimize salinity stress.



**Fig : Sample location**



**Fig : Sample collection**

## Overall Interpretation and Conclusion

The water quality of Orathupalayam Dam reflects the combined effects of climate, geology, and storage conditions typical of semi-arid regions. High evaporation, limited rainfall dilution, natural rock weathering, and irrigation return flows contribute to elevated salinity and hardness. While the water is not suitable for direct drinking without treatment, it remains a usable resource for irrigation when managed carefully. This assessment highlights the importance of understanding water quality characteristics to ensure sustainable and informed utilization of surface water resources in regions like Uthukuli.