WATER QUALITY MONITORING REPORT

LAKE OVERVIEW

Lake Name	DTU Lake
Location	Northwest Delhi
Area	12.0 hectares
Reporting Period	2025-10-25 to 2025-11-25
Report Generated	2025-11-25 00:00:52

WATER QUALITY MEASUREMENTS (7 Decimal Precision)

Date	Turbidity (NTU)	TSS (mg/L)	Chlorophyll (µg/L)	NDVI	NDWI
2025-11-06	0.8850348	0.5499151	0.5355060	1.0000000	0.0000000
2025-11-09	0.8850358	0.5499159	0.5355061	0.5870947	0.4485699
2025-11-14	0.8850340	0.5499144	0.5355058	0.1057609	0.9006065
2025-11-19	0.8850338	0.5499139	0.5355058	0.0000000	0.8345177

STATISTICAL SUMMARY

Parameter	Min	Max	Average
Turbidity (NTU)	0.8850338	0.8850358	0.8850346
TSS (mg/L)	0.5499139	0.5499159	0.5499148
Chlorophyll (µg/L)	0.5355058	0.5355061	0.5355059

AI-POWERED ANALYSIS & RECOMMENDATIONS

Water Quality Analysis of DTU Lake for Agricultural and Irrigation Suitability **Summary:** The water quality data from DTU Lake (Northwest Delhi) between October 25 and November 25, 2025, indicates relatively stable conditions across the monitored parameters (turbidity, TSS, chlorophyll, NDVI, and NDWI) within the snapshot period. While seemingly consistent, a comprehensive, long-term dataset is crucial for definitive recommendations. Based on this limited data, there are both opportunities and potential risks for agricultural and irrigation practices. **Parameter Interpretation & Potential Impacts:** * **Turbidity (Avg. ~0.885):** Generally stable. High turbidity can reduce light penetration, hindering photosynthesis in aquatic plants and potentially impacting crops that rely on irrigation with this water source. High turbidity can also clog irrigation systems. * **TSS (Total Suspended Solids) (Avg. ~0.55):** Stable. High TSS can abrade irrigation equipment, block soil pores, and reduce infiltration. Sediment deposition on crops can hinder growth and marketability. * **Chlorophyll (Avg. ~0.535):** Stable. Moderate chlorophyll levels suggest the presence of algae. While beneficial for nutrient cycling to some extent, excessive algal blooms (indicated by rapid chlorophyll increases) can lead to oxygen depletion upon decomposition, impacting aquatic life and potentially contributing to taste and odor problems in the water. * **NDVI (Normalized Difference Vegetation Index):** Variable (0 to 1). NDVI measures vegetation greenness. Significant NDVI variation within a short period suggests inconsistent vegetation health surrounding the lake, possibly due to agricultural practices or changing water levels. Low values (0) may indicate stressed or sparse vegetation. * **NDWI (Normalized Difference Water Index):** Variable (0 to 0.9). NDWI highlights open water features. High NDWI values indicate a strong water signal. Fluctuation indicates alterations in water content. **Potential Negative Impacts & Flags:** * **High TSS & Turbidity (If sustained over longer periods):** * Reduced sunlight penetration for crop photosynthesis. * Clogging of irrigation infrastructure. * Sediment deposition on crops, reducing yield and marketability. * Reduced soil infiltration, increasing surface runoff. * **NDVI Fluctuations:** Indicate potential crop stress/variability, which may lead to inconsistent yields if irrigation relies solely on this water source. * **Algal Blooms (Hypothetical based on Chlorophyll):** While not currently indicated strongly in the snapshot, continued monitoring is crucial. Bloom die-off can lead to oxygen depletion and the release of toxins. **Crop Suitability:** Given this limited snapshot, the water *may be* suitable for moderately tolerant crops, pending comprehensive water quality testing. * **Suitable (with precautions):** Wheat, Maize, some vegetables (carrots, onions, potatoes). These crops are relatively tolerant of moderate water quality fluctuations. * **Less Suitable:** Rice (requires large water volume and high water quality) and certain sensitive leafy vegetables may be vulnerable to poor water quality. * **Recommendation:** Pilot test different crop variants and irrigation strategies to assess the impact on yield, soil health and water quality. **Fertilizer Recommendations:** * **Type:** Slow-release fertilizers are preferred to minimize nutrient leaching. Opt for fertilizers with a balanced N-P-K ratio based on soil testing (not provided in this dataset) but trending towards lower nitrogen levels to avoid excessive nutrient runoff. * **Quantity:** Apply fertilizers based on soil test results and crop needs, aiming for the *minimum effective dose*. * **Considerations:** Utilize soil amendments (e.g., compost, biochar) to improve soil structure and water retention, reducing the need for excessive irrigation and fertilizer application. **Nutrient Leaching, Soil Degradation, & Contamination Assessment:** * **Likelihood of Leaching:** Moderate. The limited data does not provide information about soil characteristics. However, practices like over-irrigation or excessive fertilizer use can lead to leaching of nutrients (especially nitrates) into groundwater. * **Soil Degradation:** Risk exists if poor irrigation practices (e.g., using highly turbid water) contribute to soil compaction and reduced infiltration. * **Sedimentation:** Risk if the lake's water is heavily laden with suspended solids, which can deposit in irrigation canals and fields. * **Contamination:** Regular testing for heavy metals and pesticides is crucial, as runoff from agricultural lands can contaminate the lake. The data provided does not address this. **Interventions & Precautions:** * **Water Pre-Treatment:** Consider simple filtration methods (e.g., sand filters) to reduce turbidity and TSS before irrigation. Aeration can help reduce algal blooms. * **Soil Amendments:** Use organic matter (compost, manure) to improve soil structure, water retention, and nutrient availability. * **Crop Rotation:** Implement crop rotation to break pest and disease cycles, improve soil health, and reduce the need for heavy fertilizer use. * **Integrated Water Management:** Promote water conservation practices (e.g., drip irrigation) and

encourage farmers to adopt water-efficient irrigation techniques. * **Riparian Buffers:** Establish vegetated buffer zones around the lake to filter runoff and prevent pollutants from entering the water body. * **Constructed Wetlands:** Natural water treatment can be provided by the strategic placement of constructed wetlands between surface runoff and the lake, removing pollutants before they are transferred to the water source. **Actionable Steps for Local Government/Agencies:** 1. **Implement Comprehensive Water Quality Monitoring:** Establish a continuous, long-term water quality monitoring program for DTU Lake, including parameters such as nutrient levels (nitrogen, phosphorus), heavy metals, and pesticides. Analyze this data regularly to identify trends and potential problems. 2. **Provide Training and Technical Assistance to Farmers:** Offer workshops and on-site consultations to educate farmers about sustainable agricultural practices, water-efficient irrigation techniques, and responsible fertilizer management. Promote the use of soil testing to optimize fertilizer application. 3. **Invest in Irrigation Infrastructure and Water Management:** Upgrade existing irrigation systems to improve water efficiency (e.g., promote drip irrigation). Implement water harvesting and storage techniques to reduce reliance on the lake during dry periods. By proactively implementing these measures, the local government/agencies can support sustainable agriculture, protect water resources, and ensure the long-term productivity of agricultural lands in the region.

RECOMMENDED GOVERNMENT INTERVENTIONS

1. Establish monitoring frequency based on detected anomalies and risk levels.

2. Coordinate with agricultural departments for irrigation scheduling and water treatment protocols.

3. Implement pollution source tracking and mitigation near upstream industrial/urban areas.

4. Conduct quarterly soil and water testing to validate satellite-derived indices (NDVI, NDWI).

5. Set up early warning systems for TSS/Turbidity spikes indicating contamination events.

6. Engage local farming communities in data-driven decision-making for crop selection and fertilizer use.
