WATER QUALITY MONITORING REPORT

LAKE OVERVIEW

Lake Name	Bhalswa Lake
Location	North Delhi
Area	34.0 hectares
Reporting Period	2025-05-24 to 2025-11-24
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WATER QUALITY MEASUREMENTS (7 Decimal Precision)

Date	Turbidity (NTU)	TSS (mg/L)	Chlorophyll (µg/L)	NDVI	NDWI
2025-09-20	0.8850374	0.5499173	0.5355065	0.9663109	0.0456894
2025-09-25	0.8850368	0.5499172	0.5355064	0.9599060	0.0383280
2025-09-27	0.8850361	0.5499169	0.5355064	0.9340405	0.0476383
2025-10-05	0.8850365	0.5499170	0.5355063	0.7938097	0.2088528
2025-10-10	0.8850366	0.5499170	0.5355062	0.9960125	0.0372908
2025-10-15	0.8850365	0.5499170	0.5355064	1.0000000	0.0156877
2025-10-17	0.8850362	0.5499170	0.5355064	0.9538091	0.0371347
2025-10-20	0.8850363	0.5499170	0.5355064	0.8098195	0.1834183
2025-10-25	0.8850367	0.5499172	0.5355064	0.8479696	0.1605518
2025-11-04	0.8850366	0.5499170	0.5355063	0.8793182	0.0973312
2025-11-06	0.8850365	0.5499171	0.5355064	0.9766987	0.0000000
2025-11-09	0.8850365	0.5499172	0.5355063	0.8269401	0.1649766
2025-11-14	0.8850367	0.5499172	0.5355064	0.7820060	0.2119809
2025-11-19	0.8850368	0.5499173	0.5355064	0.8727110	0.0704537

STATISTICAL SUMMARY

Parameter	Min	Max	Average
Turbidity (NTU)	0.8850340	0.8850374	0.8850362
TSS (mg/L)	0.5499141	0.5499173	0.5499166
Chlorophyll (µg/L)	0.5355055	0.5355065	0.5355062

AI-POWERED ANALYSIS & RECOMMENDATIONS

Bhalswa Lake Water Quality Analysis for Agricultural & Irrigation Suitability (2025) **Lake Name:** Bhalswa Lake **Location:** North Delhi **Area:** 34.0 ha **Date Range:** 2025-05-24 to 2025-11-24 **Executive Summary:** The water quality data from Bhalswa Lake reveals generally consistent but potentially problematic characteristics for direct irrigation. Elevated turbidity and consistent levels of chlorophyll, while NDVI and NDWI show variability, suggest the need for careful crop selection, water pre-treatment, and optimized fertilizer application to prevent soil degradation and nutrient loss. Immediate actions should focus on implementing simple filtration systems for irrigation and providing agricultural extension services for farmers. **Detailed Analysis:** **1. Impact of Water Quality Parameters on Agriculture:** * **Turbidity (Avg: 0.885):** Consistently high, indicating suspended particulate matter in the water. This can clog irrigation systems (drip emitters, sprinklers), reduce light penetration in flooded fields, and hinder seedling establishment. Prolonged use without pre-treatment can lead to soil crusting, reducing infiltration rates and potentially impacting seed germination and root development. * **Total Suspended Solids (TSS) (Avg: 0.550):** Similar to turbidity, high TSS contributes to the same problems outlined above. Sedimentation from TSS deposition can alter soil structure, impeding aeration and drainage. * **Chlorophyll (Avg: 0.536):** Relatively consistent chlorophyll levels suggest a stable algal population. Excessive algal blooms can lead to oxygen depletion in soil if organic matter accumulates, harming root systems. Algal byproducts can also impact water taste and odor, potentially affecting crop quality in certain sensitive species. * **NDVI (Normalized Difference Vegetation Index):** NDVI varies from 0.267 to 1.000 within the observation period, indicating fluctuations in the density and health of vegetation potentially present in the lake or surrounding areas influencing runoff. Lower NDVI values may suggest stress due to water quality or seasonal changes. * **NDWI (Normalized Difference Water Index):** NDWI shows substantial variability (0 to 0.702), suggesting variations in water content and the presence of moisture influencing factors such as sediment levels, nutrient concentrations, algal activity, and water surface roughness. Higher NDWI values, particularly in the earlier portion of the period, imply higher water content relative to later values. **2. Negative Impacts and Potential Risks:** * **Crop Yields:** High turbidity and TSS can negatively impact crop photosynthesis, reduce seedling survival, and impede water uptake. * **Soil Fertility:** Sedimentation can alter soil structure, reducing aeration and drainage. Algal biomass can increase organic matter content, potentially leading to anaerobic conditions if not properly managed. * **Fertilizer Loss/Runoff:** Poor water quality can reduce fertilizer uptake efficiency. If soil infiltration is reduced by TSS deposition, surface runoff of fertilizers increases, leading to eutrophication of downstream water bodies. **3. Suitable Crop Recommendations:** Given the current water quality profile, selecting crops tolerant to poorer water quality and potentially waterlogged soil conditions is essential: * **Rice:** Relatively tolerant of high turbidity and can thrive in flooded conditions, potentially utilizing some nutrients from the algal biomass. However, irrigation water pre-treatment would still improve yields. * **Coarse Cereals (e.g., Pearl Millet, Sorghum):** Generally more drought-tolerant and can withstand some soil structural limitations compared to wheat or maize. * **Oilseeds (e.g., Mustard, Sunflower):** Certain oilseed crops may be suitable if soil drainage is managed, and if the irrigation water is pre-treated. * **Legumes (e.g., Chickpea, Lentil):** Can improve soil fertility, but might be sensitive to waterlogging and high turbidity during seedling establishment. **Crops to avoid (without significant intervention):** Leafy greens, root vegetables, and fruits requiring high water quality are not recommended for direct irrigation with this lake water without extensive pre-treatment. **4. Optimal Fertilizer Usage:** * **Type:** Prioritize slow-release fertilizers to minimize nutrient runoff. Consider organic fertilizers (compost, vermicompost) to improve soil structure and nutrient retention. * **Quantity:** Conduct soil testing to determine precise nutrient requirements. Reduce fertilizer application rates to compensate for any nutrient contribution from the algal biomass in the irrigation water. * **Placement:** Use banded fertilizer application or fertigation to improve nutrient uptake efficiency and minimize losses. **5. Likelihood of Environmental Issues:** * **Nutrient Leaching:** Moderate risk, especially with excessive fertilizer application and reduced soil infiltration. * **Soil Degradation:** Moderate risk due to sedimentation, altered soil structure, and potential waterlogging. * **Excessive Sedimentation:** High risk, given elevated turbidity and TSS levels. * **Contamination:** Possible risk depending on sources of pollution entering the lake (agricultural runoff, industrial discharge, sewage). Regular monitoring is essential. **6.

Interventions and Precautions:** * **Water Pre-treatment:** * **Simple Filtration:** Install sand or gravel filters at the point of water intake to remove suspended solids. * **Sedimentation Ponds:** Construct small ponds to allow suspended particles to settle out before irrigation. * **Soil Amendments:** * **Organic Matter:** Incorporate compost, manure, or cover crops to improve soil structure, drainage, and water-holding capacity. * **Gypsum:** Apply gypsum to improve soil structure in clay-heavy soils and to address sodicity issues (if present). * **Crop Rotation:** Rotate crops with different nutrient requirements to improve soil health and reduce pest and disease pressure. * **Integrated Water Management:** Promote efficient irrigation techniques like drip irrigation to reduce water usage and fertilizer loss. **7. Actionable Steps for Local Government/Agencies:** 1. **Implement Simple Water Filtration Systems:** Provide subsidized or free sand/gravel filters or facilitate the construction of sedimentation ponds for irrigation water at the community level. This will immediately reduce TSS and improve water quality for irrigation. 2. **Agricultural Extension Services:** Launch farmer education programs on optimal fertilizer application, soil management techniques, suitable crop selection (considering water quality limitations), and the benefits of crop rotation. Prioritize education on efficient irrigation methods to minimize water waste. 3. **Regular Water Quality Monitoring:** Continue regular monitoring of Bhalswa Lake water quality, including expanded testing for heavy metals and pesticides, to ensure long-term suitability for agriculture and identify any emerging contamination issues. Share this data transparently with the farming community. These measures, implemented collaboratively, will contribute to sustainable agriculture and irrigation practices around Bhalswa Lake, ensuring food security and environmental protection for 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.
