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
Report Generated	2025-11-24 05:16:00

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

Water Quality Analysis for Agricultural and Irrigation Suitability: Bhalswa Lake **Lake Name:** Bhalswa Lake **Location:** North Delhi **Area:** 34.0 ha **Date Range:** 2025-05-24 to 2025-11-24 **Overall Assessment:** The recent data snapshot of Bhalswa Lake indicates relatively stable but concerning water quality parameters. The key challenges appear to be consistently high turbidity and TSS, while chlorophyll levels are moderate. NDVI fluctuates significantly, suggesting variability in vegetation cover surrounding the lake. NDWI shifts throughout the analyzed period, but values appear within a potentially acceptable range, given adequate consideration. The combination of these factors has implications for irrigation suitability, soil health, and agricultural productivity. **Detailed Parameter Interpretation & Impact:** * **Turbidity (Avg. 0.885):** Consistently high turbidity implies high concentrations of suspended particles, including clay, silt, organic matter, and microorganisms. * **Impact:** Reduced light penetration, hindering photosynthesis in aquatic plants and potentially impacting downstream ecosystems. If used for irrigation, high turbidity can clog irrigation systems (drip lines, sprinklers), reduce water infiltration into the soil, and decrease crop yields by coating leaf surfaces and inhibiting photosynthesis. * **Flag:** Consistently high values require investigation into the source of suspended solids (e.g., erosion, industrial discharge, sewage). * **Total Suspended Solids (TSS) (Avg. 0.549):** Similar to turbidity, high TSS indicates a large quantity of particulate matter in the water. * **Impact:** TSS contributes to turbidity, exacerbating its negative effects. It can also carry pollutants like heavy metals and pathogens, posing risks to soil health and human health if used for irrigation. Accumulation of TSS in soil can lead to reduced soil porosity and aeration. * **Flag:** TSS levels correlate directly with turbidity, reinforcing concerns about water quality for irrigation. * **Chlorophyll (Avg. 0.535):** Moderate Chlorophyll levels indicate the presence of algae and phytoplankton in the water. * **Impact:** While a certain level of chlorophyll is normal, excessive levels can indicate eutrophication (nutrient enrichment). This can lead to algal blooms that deplete oxygen, harm aquatic life, and produce toxins harmful to humans and animals. * **Flag:** Moderate Chlorophyll can also point to organic matter enrichment in the lake. * **Normalized Difference Vegetation Index (NDVI):** NDVI measures vegetation greenness and health. Fluctuations between 0.26 and 1 over the period indicate varying vegetation cover in the surrounding area. * **Impact:** High NDVI generally suggests healthy vegetation that can help stabilize soil and reduce erosion. Lower NDVI suggests sparser or stressed vegetation, potentially increasing runoff and sedimentation into the lake. * **Flag:** The wide NDVI range indicates sensitivity to seasonal changes or local disturbances. Monitor NDVI trends to assess the health of riparian vegetation. * **Normalized Difference Water Index (NDWI):** NDWI indicates water content in vegetation and open water bodies. The range from near 0 to 0.7 reveals a reasonable degree of water within the lake and vegetation. * **Impact:** High NDWI in surrounding vegetation can indicate healthy growth, while lower values indicate water stress. Overall, the values provide a context for water availability and plant health within the area. * **Flag:** This parameter doesn't suggest immediate concern on its own but it does offer more context when combined with the other factors (especially NDVI). **Implications for Agriculture:** * **Irrigation Water Safety:** The high turbidity and TSS levels raise concerns about the direct use of Bhalswa Lake water for irrigation without pre-treatment. Clogging of irrigation systems and potential contamination of crops are significant risks. * **Soil Health:** Long-term irrigation with untreated water can lead to soil degradation, reduced permeability, and accumulation of pollutants. * **Agricultural Productivity:** Reduced water infiltration, inhibited photosynthesis, and potential contamination can all negatively impact crop yields. **Crop Suitability:** Given the current water quality profile, the following considerations should be made when choosing crops: * **Prioritize crops tolerant to higher turbidity and TSS levels:** This might include crops that can withstand occasional sediment deposition on leaves. * **Consider water pre-treatment options:** Filtration or sedimentation could be necessary for more sensitive crops. * **Potential crops:** Rice (with careful water management), certain vegetables with overhead irrigation (after sedimentation). Drought-resistant crops and water-efficient irrigation techniques will be helpful. Avoid sensitive leafy greens or crops where direct contact with irrigation water is undesirable without proper treatment. **Fertilizer Usage:** * **Minimize fertilizer use:** High turbidity and TSS suggest a risk of nutrient runoff, leading to further water quality degradation. * **Use slow-release fertilizers:** These minimize the risk of leaching and allow plants to utilize nutrients more efficiently. * **Soil testing:** Regular soil testing is

crucial to determine the actual nutrient needs of crops and avoid over-fertilization. * **Organic Fertilizers:** Prefer organic fertilizers to chemical ones. They are more water-retentive and less prone to runoff. * **Precision Fertilization:** Employ techniques like fertigation to deliver nutrients directly to the root zone, reducing losses. **Likelihood of Environmental Issues:** * **Nutrient Leaching:** High risk, especially with excessive fertilizer use. * **Soil Degradation:** Moderate risk due to sedimentation and potential pollutant accumulation. * **Excessive Sedimentation:** High risk, contributing to turbidity and clogging waterways. * **Contamination:** Moderate risk, depending on the source of TSS (industrial discharge, sewage). **Recommended Interventions & Precautions:** * **Water Pre-Treatment:** Implement sedimentation basins or filtration systems to remove suspended solids before irrigation. Constructed wetlands for polishing the water could also be an option. * **Soil Amendments:** Incorporate organic matter (compost, manure) to improve soil structure, water infiltration, and nutrient retention. * **Crop Rotation:** Rotate crops to improve soil health, reduce pest and disease pressure, and optimize nutrient utilization. * **Integrated Water Management:** Implement water-efficient irrigation techniques (drip irrigation, micro-sprinklers) to minimize water usage and reduce runoff. Rainwater harvesting can supplement irrigation needs. Promote water conservation practices among farmers. * **Riparian Buffers:** Plant vegetation along the shoreline to filter runoff and stabilize soil. * **Water Quality Monitoring:** Continue regular monitoring of key water quality parameters to track trends and assess the effectiveness of interventions. **Actionable Steps for Local Government/Agencies:** 1. **Invest in Water Pre-Treatment Infrastructure:** Establish centralized water treatment facilities for irrigation purposes, focusing on sediment removal. This could be achieved through partnerships with agricultural cooperatives or private companies. 2. **Promote Soil Health Management Practices:** Conduct farmer training programs on soil conservation techniques, organic farming practices, and efficient fertilizer use. Subsidize the cost of soil testing and provide access to organic amendments. 3. **Enforce Environmental Regulations:** Strengthen monitoring and enforcement of regulations to prevent pollution from industrial and agricultural sources. Implement stricter controls on wastewater discharge and promote responsible agricultural practices. By implementing these recommendations, the local government can support sustainable agriculture, protect water resources, and ensure long-term agricultural productivity in the Bhalswa Lake 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.
