# AquaWatch Smart Water Integrated Management System (SWIMS)

# Agriculture Case Study

*Water Management, Simplified*

## OVERVIEW

Agricultural activities significantly influence water quality, particularly in regions with intensive farming. This study assesses how farming practices impact water quality and provides recommendations for improved management strategies.

## PROJECT

This project analysed continuous water quality monitoring data from three stations along an agricultural watershed to evaluate pollutant sources and mitigation strategies. The study aims to identify key drivers of water degradation and suggest evidence-based improvements.

## METHODOLOGY

**Monitoring Locations:**

- Upstream Pond (V-140): Detention pond above agricultural activities.
- Mid-Reach (V-141): Adjacent to active farming operations.
- Downstream (V-057): Cumulative impact assessment point.

**Monitored Parameters:**

- Dissolved Oxygen (DO), Turbidity, pH, Temperature, Conductivity, Rainfall.

**Analysis Approach:**

- Assessing spatial trends in pollutant levels.
- Evaluating seasonal and event-driven variations.
- Identifying critical pollution drivers.

## KEY RESULTS

- DO depression at mid-reach suggests organic rich runoff.
- High turbidity spikes during rainfall indicate soil erosion and poor riparian buffering.
- Downstream impacts show cumulative pollutant transport.
- Upstream pond mitigates some impacts but is still influenced by agricultural activities.

## RECOMMENDATIONS

**Immediate Actions:**

- Establish dense vegetated riparian buffers.
- Implement erosion control via cover crops and contour plowing.
- Adjust fertiliser application timing to prevent excessive nutrient runoff.
- Restrict livestock access to streams.

**Medium-Term Improvements:**

- Develop sediment retention basins.
- Install tile drainage systems.
- Establish wetland treatment areas.

**Long-Term Strategies:**

- Convert high-risk areas to permanent vegetation.
- Expand wetland treatment solutions.
- Establish permanent riparian forests.

## CONCLUSION

### Scalable Approach for Agricultural Water Management:

Monitoring coupled with AI-powered analysis delivered precise, real-time insights into farm runoff dynamics, identifying effective practices like sediment retention while highlighting areas for improvement, such as nutrient management.

### Long-Term Environmental and Economic Benefits:

Automated water quality monitoring and targeted agricultural interventions provide both sustainable ecosystem outcomes and long-term farm viability. It is possible to improve water quality whilst retaining productivity

### Replicable Model for Water Quality Improvement:

This phased management approach can be adapted to different agricultural settings, demonstrating a clear pathway for balancing productivity with environmental responsibility.