

# **PREDICTIVE MODELING OF POLLUTION IN RIVER BASINS USING MACHINE LEARNING TECHNIQUE**

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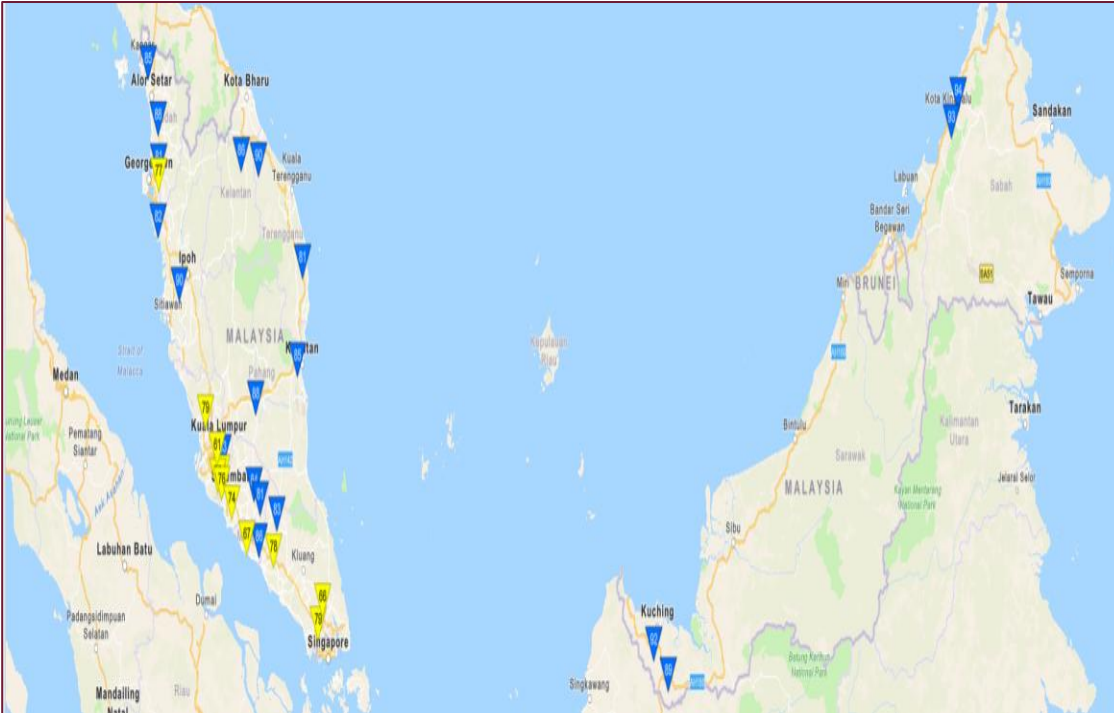
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# PRESENTATION OUTLINE



# Research Overview



Water pollution in river basins is a critical environmental issue that poses significant risks to ecosystems, public health, and economic development.

Effective management of river basins requires a proactive approach to predict and mitigate pollution levels.

This research focuses on leveraging machine learning (ML) techniques to develop predictive models for pollution in river basins, enabling stakeholders to identify and address contamination sources before they reach critical levels.

River Water Quality Index Management System  
(RQIMS)

# Research Problem, Research Objective and Research Questions

## Research Problem

- River basin pollution is a major environmental challenge, impacting ecosystems, human health, and socio-economic development
- Existing methods are time-consuming, labor-intensive, and limited in spatial and temporal coverage
- Predicting pollution levels becomes quite impractical.

## Research Objective

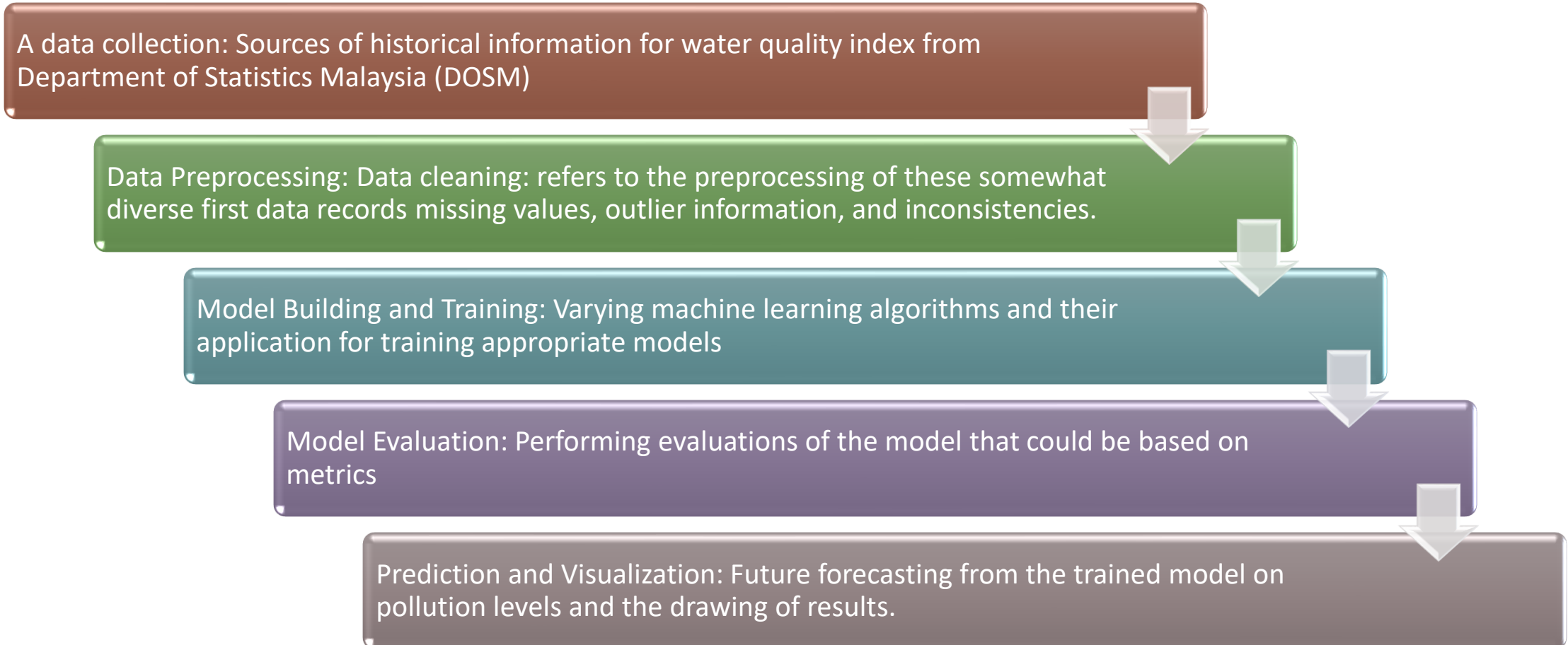
- To collect historical water quality data
- To develop a machine learning models
- To evaluate the models according to appropriate dimensions

## Research Questions

- What are the effective skills for collecting and pre-processing high-quality, relevant, and consistent water quality data?
- Which of the machine learning algorithms would work best in the prediction of pollution levels in Malaysian?
- What way does the use of appropriate metrics to evaluate developed models?



# Scope of Research



# Significant of Research

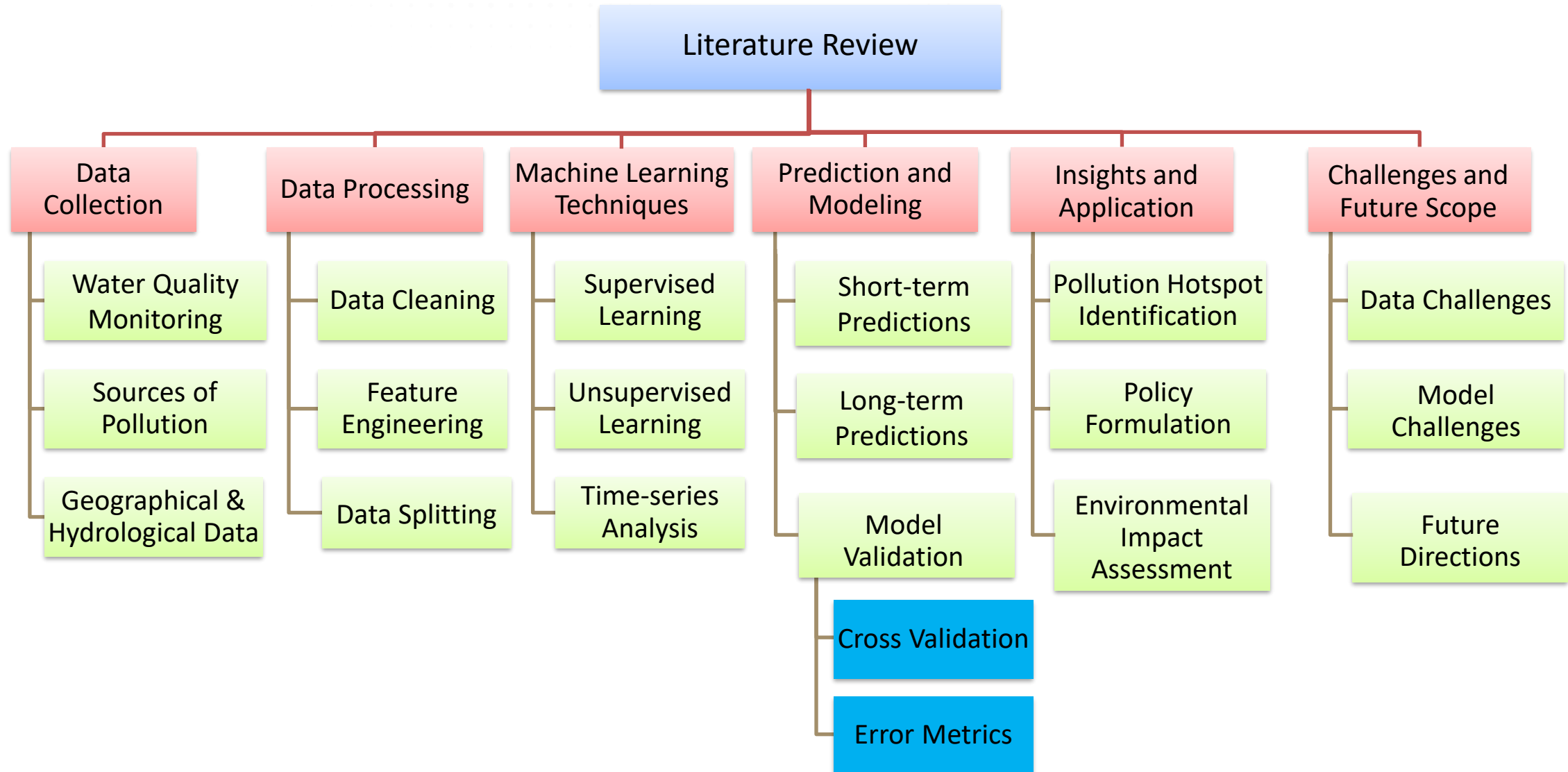
Revolutionize water resource management and environmental sustainability.

Develop advanced models that can accurately predict pollution levels in river basins.

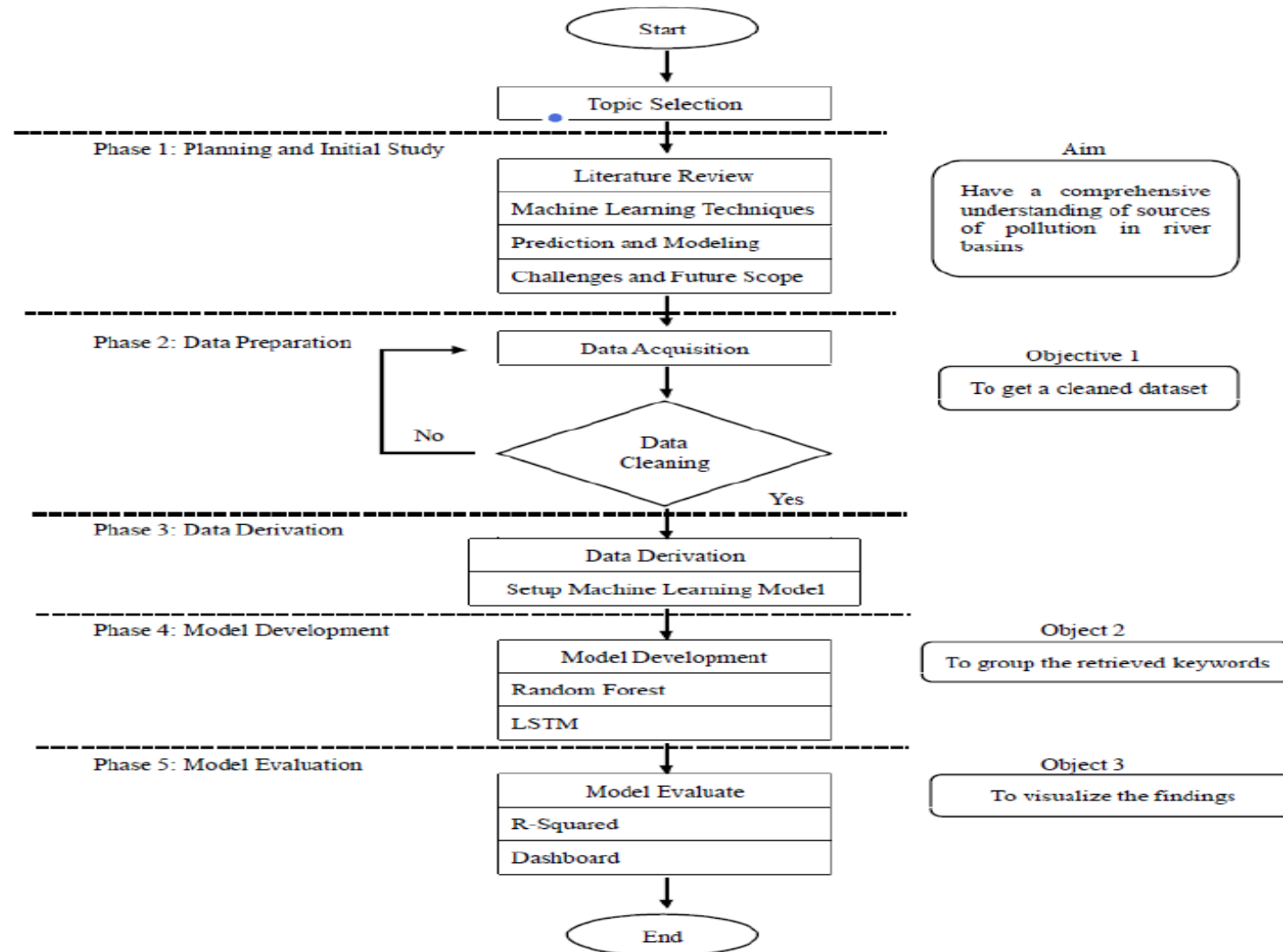
Enhance water quality monitoring by early detection of pollution events, enabling timely interventions to mitigate environmental degradation

Contribute to the advancement of machine learning applications, particularly in environmental sciences, opening up new avenues for innovation and problem-solving

# Literature Review



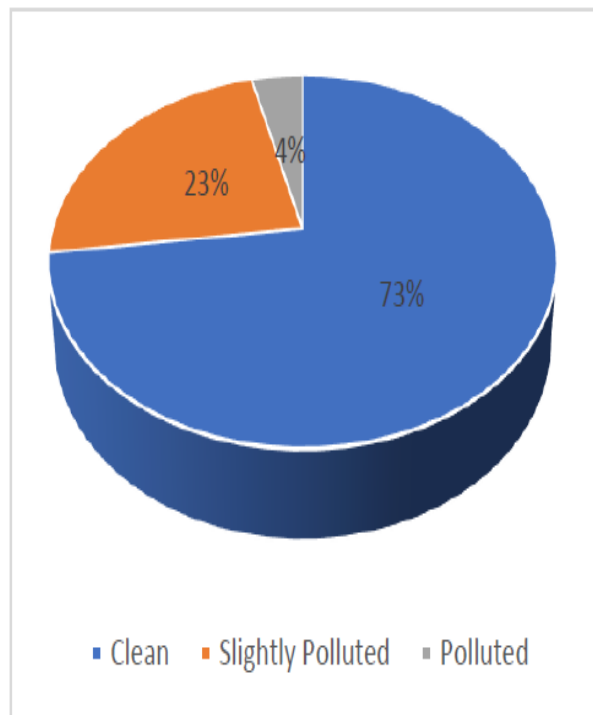
# Methodology



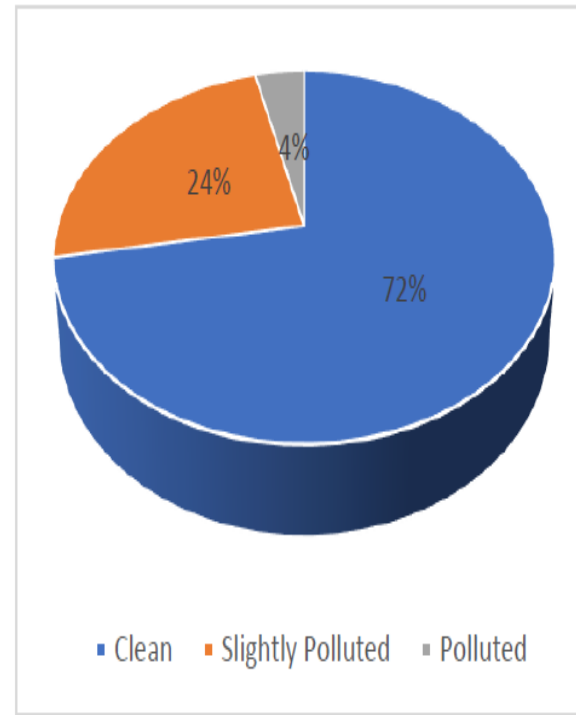
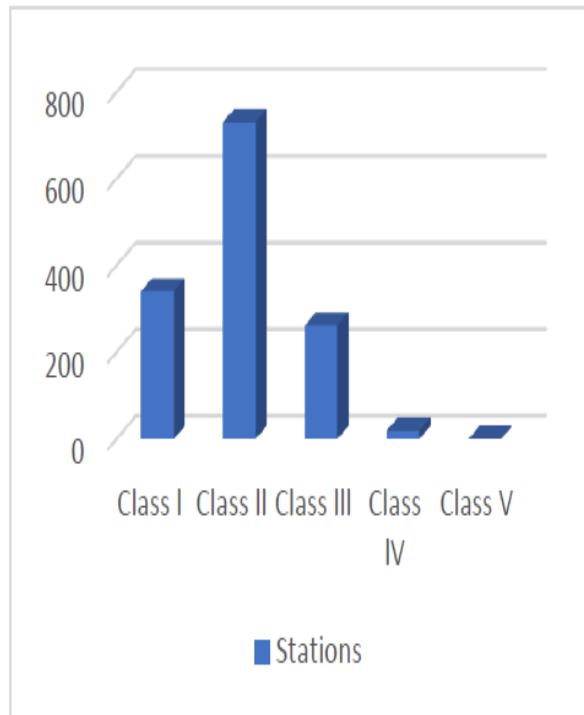
- Phase 1: Planning and Initial Study
- Phase 2: Data Preparation
- Phase 3: Data Derivation
- Phase 4: Model Development
- Phase 5: Model Evaluation



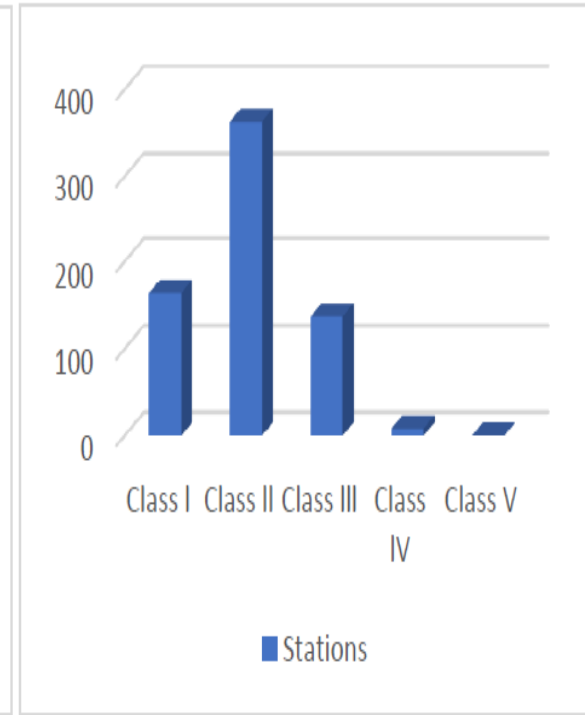
# Initial Results



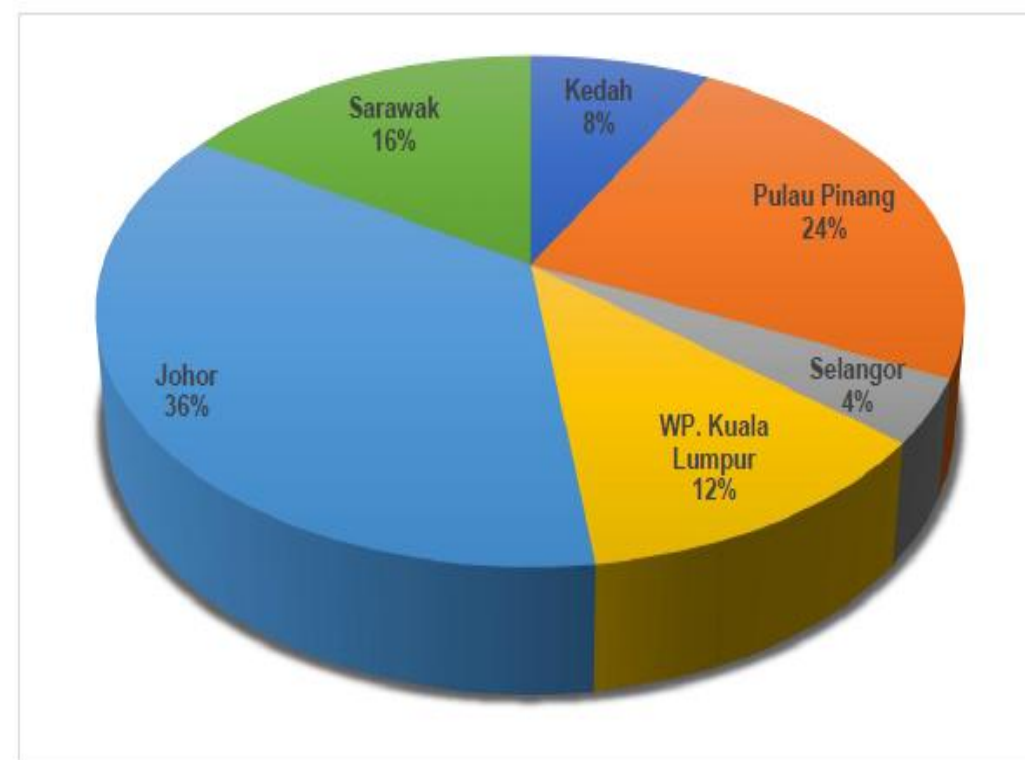
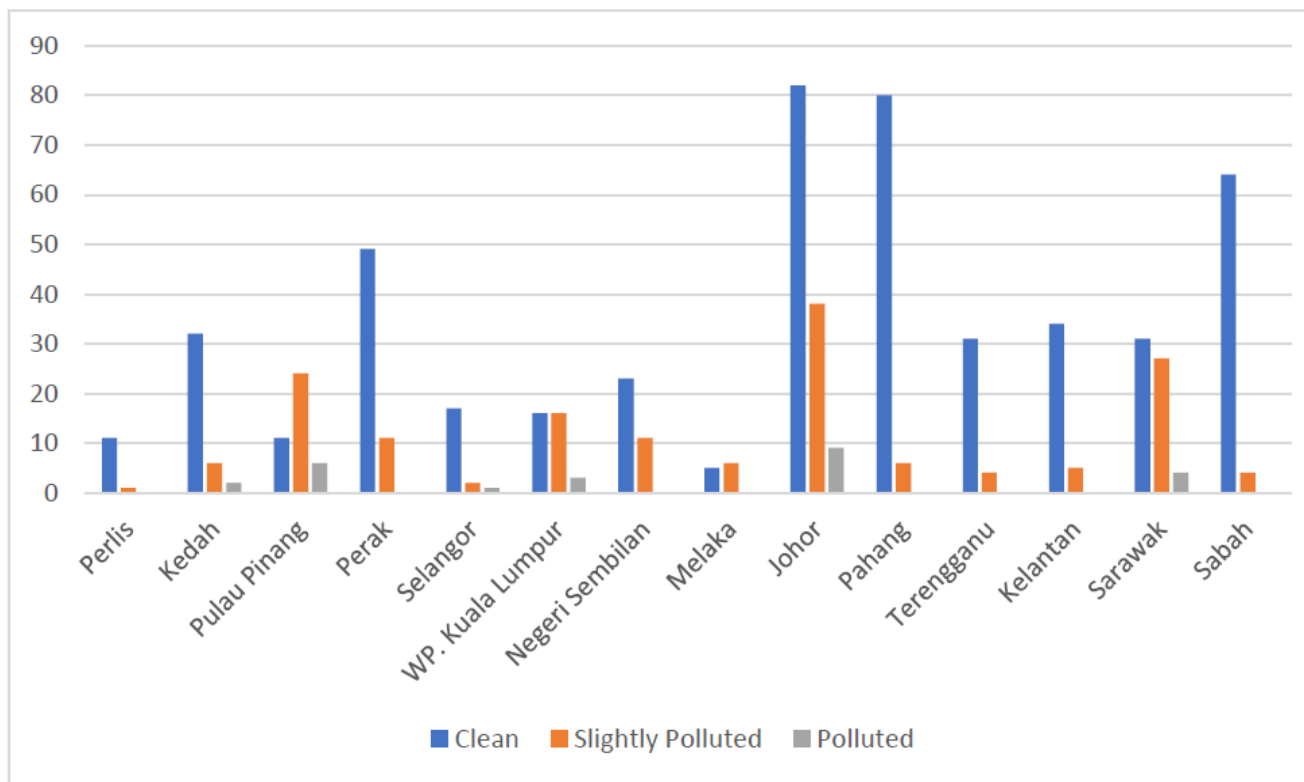
Water quality status by station



Water quality status by river



# Initial Results



Pollution in River Basins by State

# Conclusion

- This study demonstrates the potential of machine learning to improve water quality management in Malaysian rivers.
- By analyzing historical water quality data, predictive models were developed to provide accurate and real-time insights into pollution levels.
- Improvements in key indicators, such as Biochemical Oxygen Demand (BOD5) and Suspended Solids (SS), highlight the positive impact of ongoing policies and interventions.
- However, challenges like inconsistent data and system integration must be addressed to enhance model effectiveness.
- Overall, this research provides a practical framework for using machine learning to support sustainable water resource management and pollution reduction in Malaysia.

# Future Works

- Future work on predictive modeling of river basin pollution will focus on improving model accuracy, scalability, and real-world application.
- This includes integrating advanced techniques like deep learning and ensemble methods, using real-time data from IoT sensors and satellites, and combining machine learning with GIS for geospatial analysis.
- Models will also be enhanced to simulate scenarios, such as policy changes and climate impacts, and adapted for global application across diverse river basins.
- Collaboration with policymakers, industries, and communities will ensure the models are practical and support effective decision-making for sustainable water management.

# THANK YOU



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