# **A novel approach to estimate water quality of inland aquaculture ponds using satellite data and WQI model**

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Abstract:

Assessment of the water quality in aquaculture ponds on land is essential for maintaining the wellbeing and productivity of aquatic ecosystems. A popular tool for thoroughly assessing the quality of surface water is the Water Quality Index (WQI) model. In order to assess water quality parameters in inland aquaculture ponds, this work introduces a novel method that integrates satellite data and the WQI model, improving the accuracy and effectiveness of water quality monitoring. The proposed approach integrates multispectral satellite imagery and machine learning techniques to predict key water quality parameters. The WQI model is used concurrently to combine various parameter predictions into a single index, offering a comprehensive evaluation of water quality. This hybrid methodology provides a solid framework for overcoming classic WQI models' drawbacks, such as their region-specific applicability.

An extensive dataset of in-situ water quality measurements gathered from several aquaculture ponds is used to validate the methodology. Strong relationships between the predicted models for the individual parameters and the field measurements are shown. A machine learning model was explored to predict the water quality parameters and the outcomes are measured against ground truth values. This validation emphasises how accurate the suggested method is for calculating and assessing water quality conditions. In conclusion, the WQI model and the integration of satellite data offer an innovative approach for determining and assessing the water quality in inland aquaculture ponds. This methodology creates new opportunities for resource management, environmental preservation, and sustainable aquaculture practices by overcoming the constraints of conventional methods. The hybrid approach provided in this study has potential for redefining water quality evaluation across multiple water bodies and geographical contexts as remote sensing and modelling techniques continue to progress.

Keywords: Satellite data, WQI, Shrimp farming