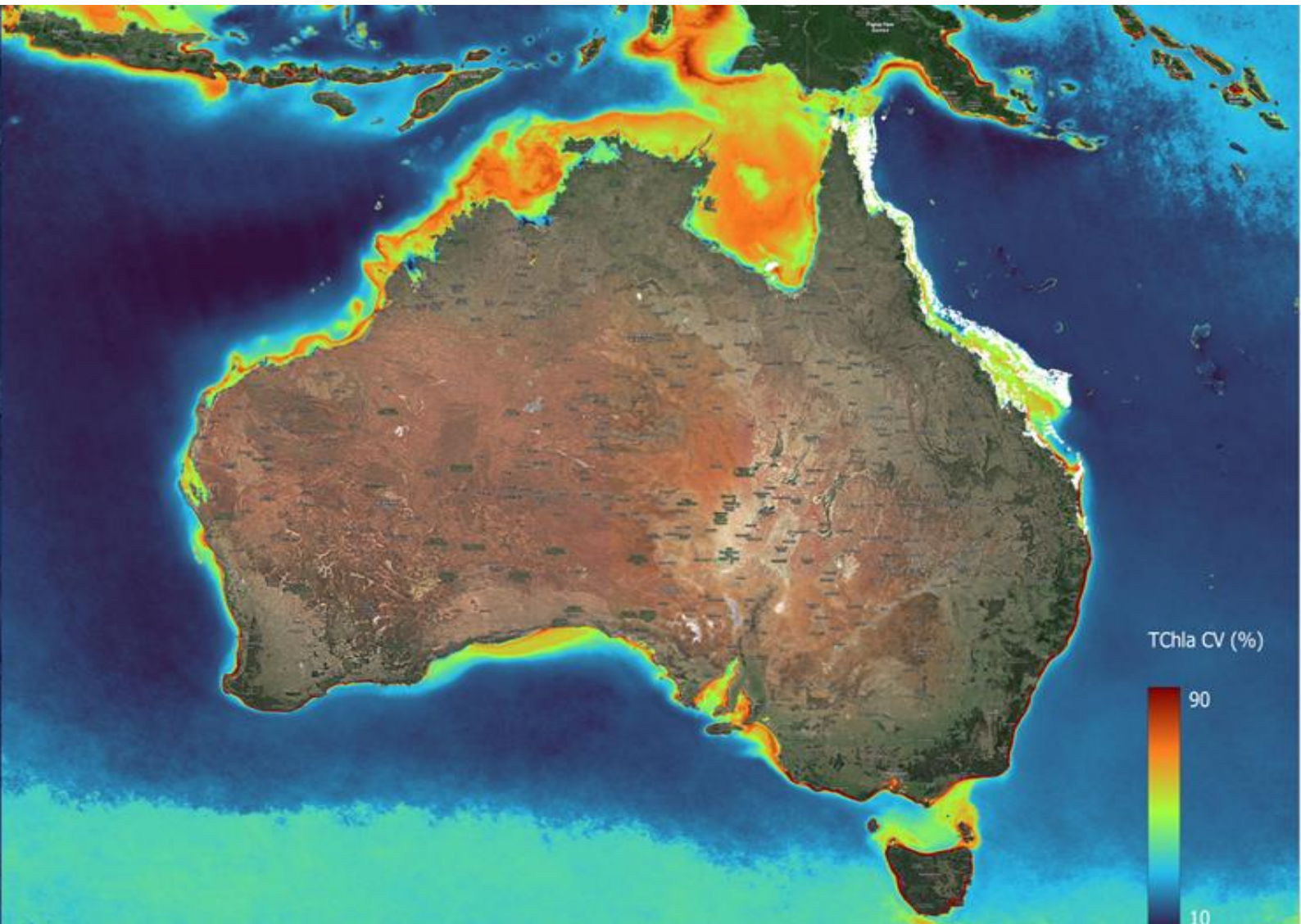
CSIRO

Australia's National
Science Agency

AquaWatch Australia and AI Water Quality Modelling

Empowering decision making using integrated ground-to-space monitoring system for better water quality data insights



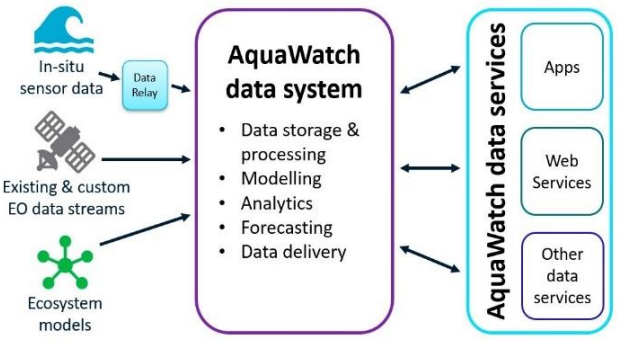
Water quality is a global issue

Around the world there are exponential increases on water demands and pollution due to population increase, expanding industrialisation, economic growth and increased agricultural activities. The decline in water quality remains a serious threat to the local environment, health of the community and economy, and has been identified as a key Sustainable Development Goal (SDG) indicator.

Access to real-time water quality data, including key parameters that show environmental changes in the aquatic environment - such as algal activity can support effective mitigation strategies and control measures to minimise the impact of significant events. Conversely, understanding algal activity, when not harmful, can enhance sustainable and self-sufficient food sources for the local communities, by improved aquaculture and fishing practices.

CSIRO's AquaWatch System

CSIRO's AquaWatch Australia (AquaWatch) program aims to improve the accuracy of water quality monitoring data globally, providing scientifically robust water quality products and services to our partners, to ensure they have access to water quality data that is accurate and can support decision making processes.



Artificial Intelligence and Water Quality

Alongside physics-based, mechanistic water quality models, AquaWatch leverages artificial intelligence (AI) and deep learning models to enhance water quality monitoring. This AI-based approach offers several advantages, including improved predictive accuracy, reduced uncertainty, and deeper insights into various water quality parameters. By quantifying the cause-and-effect relationships between biogeochemical parameters, it enables precise and comprehensive understanding of water quality dynamics.

Advances in Water Quality Modelling

AquaWatch utilises an advanced water quality modelling approach that uniquely combines physics-informed training with machine learning techniques. This powerful coupling of bio-optical spectral libraries and machine learning enables the development of sophisticated tools for monitoring key water quality parameters, such as Chlorophyll-a concentrations, providing more accurate and reliable insights into water quality and ecosystem health.

Chlorophyll-a, a pigment found in algae, serves as a crucial indicator of algal presence in aquatic environments. The AquaWatch water quality monitoring approach leverages advanced deep learning models and satellite Earth observation (EO) data to map chlorophyll-a concentrations, even in optically complex waters. These machine learning models accurately capture the intricate relationships between various water quality factors, allowing for the creation of detailed, high-resolution maps that reveal the distribution of phytoplankton Chlorophyll-a in aquatic ecosystems, even in challenging environmental conditions. This product will enable end users to monitor changes in water quality, detect algal blooms, and make informed decisions regarding water management and mitigation efforts.

Early Warning Forecasting

The early warning forecasting system combines in-situ sensing, satellite EO and hydrodynamic and biogeochemical modelling tools to deliver accurate water quality forecasts across diverse aquatic systems, including rivers, lakes, and coastal waters.

AquaWatch Australia has the capacity to effectively assimilates diverse data streams, reducing uncertainty and enhancing the accuracy of predictions.

Get involved

If you are interested in learning more about AquaWatch, or building new partnerships, please reach out to find out how to be involved and to keep up to date with our progress.

For further information

AquaWatch Australia
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