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Research and Innovation Action

Delivering Advanced Predictive Tools from Medium to Seasonal Range for Water Dependent Industries Exploiting the Cross-Cutting Potential of EO and Hydro-Ecological Modelling

PrimeWater Multi User Panel Stakeholders Week (15-19 November 2021) – Executive Summary

Executive Summary

PrimeWater is a Horizon2020 funded research project that generates information on the effects of upstream changes on future water quality and quantity. Building on advanced Earth-Observation (EO) data products, integration with additional data sources and diagnostic modelling tools, public and private sector decisions for water resources management are provided with better and actionable information. Within PrimeWater, a co-development strategy is used which aims to bring together various perspectives of stakeholders in the design, development and implementation of end-products which are adopting EO-based systems in water quality management.

To facilitate co-development, an international Multi-User Panel (MUP) has been established involving industry representatives and experts from across the water sector. This second MUP Stakeholders Week took place from 15 November through 19 November 2022. This document provides a summary of the discussions and activities during the week which are informing the continued development of products and services under PrimeWater. There were 518 registered attendees throughout the week, with 63% from government organizations and university/research institutes. Participants with interest and experience in water resources management, disaster risk management, potable water, energy, amenity and recreation, and aquaculture provided inputs on problems and current response, as well as feedback on their perspectives of the application of EO monitoring and forecasting services in dealing with water quality and quantity issues.

In each sector, the lack of reliable forecast data, resulted in a lack of preparedness, which subsequently affected costs, operations, service provision, and compromised infrastructure. These concerns were addressed with prospective solutions that rely on the future development of EO-derived services and products. This includes forecasts of major events such as harmful algal blooms (HABs), floods, and droughts, and climate change predictions.

Each day the PrimeWater platform and its applications through case studies from Italy (Lake Mulargia), Australia (Lake Hume and Melbourne Western Water Treatment Plant), and the USA (Lake Harsha) were presented. The tool can be used to simulate multiple hydrological processes including algal growth, nutrient fluxes, water flow, and physico-chemical parameters. The models performing the simulations use different forms of data for calibration like meteorological forcing, in situ measurements, historical data, and EO images.

Sectoral specific presentations and discussions confirmed that each sector values the need for reliable forecasting data for the operation of systems. Predicting HABs, dissolved oxygen levels, and pollutant tracking help stakeholders plan (e.g., aquaculture harvests), take prevention measures, and secure resources to meet water demand. Many speakers mentioned a lack of reliable information resulted in higher costs due to damage, loss of aquaculture, and reactive treatment after the event

occurs. Knowing when droughts and flooding will occur also affects energy generation, infrastructure integrity, and water supply. Stakeholders prefer forecasts at least 2 weeks ahead to take proactive measures.

Coupling EO services with different methodologies (climate models, machine learning, local knowledge) was the main solution suggested throughout the week. Stakeholders pooling funds for improved access to data and services was the other option as financial limitations play a role in the type of data some companies can use. There is no 'one size fits all' solution as different geographical regions and sectors have different problems which require various EO services and products. End users' capacity building can ensure that EO service providers can tailor the services to the needs of the region and/or sector.

Along with sectoral discussions, participants engaged in GroupMap sessions, on Days 2 (Disaster Risk Management) and 5 (Amenity & recreation, and Aquaculture), to gather feedback and inputs of the participants on indicators and parameters for HAB outbreaks, as well as the barriers to water quality forecasting and warning. An important water quality indicator for both sectors is chlorophyll which is unsurprising as it can be measured in-situ and by satellite. Impact indicators identified related to disaster risk management include reduced fish productivity, reduced tourist numbers, and increase salt content which can affect agricultural production. Both sectors identified a lack of data or monitoring of water quality parameters, and the relevance of warnings to stakeholder activities as main barriers to warnings and forecasts. Financial investment was a concern from the disaster risk management sector, whereas reliability featured more prominently with the amenity & recreation, and aquaculture sectors. Finally, reflections on the benefits and impacts of 10-day forecasts highlighted that EO products and services plays an important role in overall monitoring and can provide essential early warning as well as increased reliability. Detailed descriptions of the results for each day can be found in sections 3.2 and 3.5.

Participants were also guided through a short interactive session which prepared them to complete the User preferences for Earth Observation services survey.

MUP Stakeholders Week Evaluation

A feedback survey was circulated after the MUP week and was completed by 5% of participants. Based on the responses to this survey, the majority (47%) of the participants thought the week was excellent, 33% felt it was very good, and 2% thought it was fair. The survey also asked about the technical content and its usefulness and applicability where 56% of the participants replied that the content was acceptable, and applicable in their respective sectors. For future MUPs, most of the participants responded that they would prefer the focus be on monitoring, while the remainder of respondents prefer decision support systems, and forecasting. The full breakdown of the feedback survey can be found in section 4.