

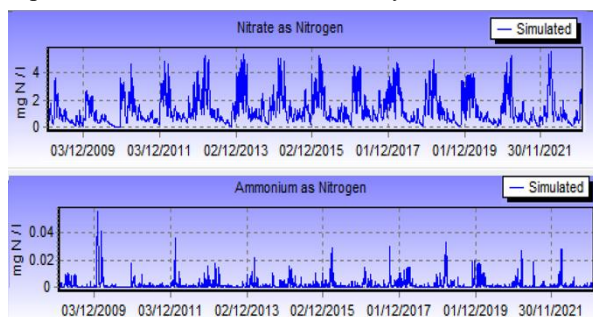
WRA Bulletin 79

July 2026

INTERNATIONAL WORK

Sandy Creek Nutrients, Australia

Following on from the review of the Great Barrier Reef Project by Paul Whitehead last year, Paul has been working with colleagues in Australia to model nutrients in one of the catchments that flow into the coast close to the Whitsunday section of the GBR. The Sandy catchment has multiple land uses including banana plantations and the high nitrate fertiliser application rates give rise to significant fluxes of nitrogen into the coastal waters. WRA is using the INCA suite of models to simulate fluxes of N, P and sediments into the river system from the range of land uses and assess their impacts on the downstream coastal system.



Daily simulated nitrate and ammonia time series in the Sandy River system

Dublin AI and WQ modelling

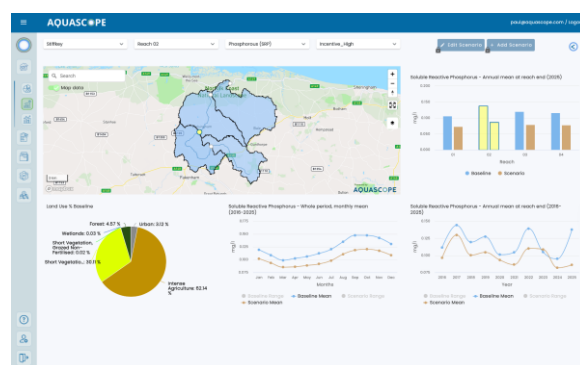
In July, Paul Whitehead attended the 13th International Congress on Environmental Modelling and Software at University College Dublin and gave a paper on water quality modelling. A key theme of the meeting was to discuss the use of new technology such as AI and Machine Learning (ML) within hydrology and WQ modelling.

Participants agreed that ML offers particular value for prediction, calibration of highly parameterised models, optimisation problems and extracting information from increasingly rich datasets (e.g. remote sensing and monitoring networks). However, improved predictive performance should not be confused with improved process understanding.

Participants agreed that AI should augment – not replace – scientific expertise and decision making. Successful adoption depends not only on technical advances but also on understanding who the decision-makers are, what decisions they make and how modelling evidence is incorporated into those decisions.

MRV and Decision Support Systems for Natural Asset Management

As the value of natural capital becomes increasingly recognised by governments, financial markets and corporations, there has been rapid growth in a range of **MRV (Measurement, Reporting and Verification)** technologies designed to more actively understand risks and impacts on the natural environment. Historically, these tools were used reactively, typically through more static environmental impact assessments or in response to pollution incidents and extreme events.



Platform page showing Norfolk catchments water quality

WRA has been working with Paul Edmunds at Aquascope to create an online platform, which integrates our **INCA modelling** framework with geospatial data, in-situ sensors and satellite observations to model entire river catchments and land-use change dynamics in near real time. This enables improved understanding of impacts on water quality and quantity, supporting both operational decision-making and transparent environmental reporting and ongoing monitoring. This work has been supported by the **European Space Agency**.



Mapping display with daily rainfall and flow for Slovenian catchments (see www.aquascope.com)

UK WORK

Water Supply for New Dungeon Ghyll Hotel

Working for the Redcat Pub Co Ltd, Ric Hines and Paul Holmes investigated the status of abstraction licences for a private water supply based on Stickle Ghyll in Ambleside, Cumbria. It is a complex system shared with neighbouring properties of Stickle Barn Tavern, Stickle Cottage and National Trust [NT] toilets, using raw water from a small dam part-way up Stickle Ghyll and from a new micro-hydro scheme. An abstraction licence [1966] included both 5 m³/d water supply and 409 m³/d hydropower. A pipeline takes raw water from the side-channel dam and hydropower penstock to the hotel treatment plant and onward feed for the neighbouring properties.



Stickle Tarn spillway and rockfill dam

Stickle Tarn rock-fill embankment dam is 4.5 m in height at the draw-off tunnel. Although originally built to augment flow in Stickle Ghyll for water supply, it was not clear where current responsibility rests for maintenance and dam inspection. There is no other water storage in the water supply system, except for the small pool at the side-dam intake site.



Side-channel dam and pipe offtakes in Stickle Ghyll

Water consumption was estimated using British Water Flows and Loads 4, code of practice [2014], which gave maximum water use by the hotel of 16.8 m³/day. Present-day abstraction is 2.5 m³/d plus unquantified feed from the NT micro-hydro scheme. The old licence is no longer relevant since consumption is higher and points of abstraction for both power generation and supply have been moved upstream. It was therefore recommended that the client discuss the abstraction and licensing with NT and clarify license current status.

Henley Regatta Flood Survey

WRA undertook a flood risk survey for the Henley Regatta. This is the UK's premier rowing event which is held every year in early July on a section of the River Thames downstream of Henley. Work focused on assessing the flood risk to the Regatta's permanent assets, namely the headquarters and boat house at Henley Bridge, the storage sheds and cottage on the east bank between Henley and Remenham, Temple Island Folley and permanent infrastructure.



Henley Rowing Club and drone footage [below]

The work included detailed fieldwork taking spot heights using GNSS based surveying, measuring points of water ingress into properties, inspecting any existing flood defence and resilience measures, taking numerous ground-based photos and a drone survey. This was accompanied by a thorough assessment of the risk of flooding on the River Thames including a review of historical flood events and the latest Environment Agency flood modelling.



A probabilistic assessment was undertaken to consider the likelihood of a flood occurring during the time when the Regatta tents, stands and hospitality were being constructed and dismantled over the period May to August. Analysing the full 120-year record of flows on the Thames, only four events greater than Q2 were experienced during this time. Overall, despite the high level of hazard with the assets being on the floodplain and bordering the river, the actual risk of flooding and damage is low due to the permanent presence of the staff and flood resilience measures adopted. These include use of flood barriers, raising electrics and vulnerable items and moving of equipment by staff.

The WRA Bulletin is a quarterly publication, and relies on contributions submitted by Partners, Associates and Consultants. The document is circulated by email, and published on the WRA web-site, aiming to keep the WRA network up-to-date with respect to current activities. Please email contributions for future issues to Paul Whitehead: paul.whitehead@watres.com

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