waterSENSE | REINFORM

REmote Sensing INtegration For Optimised Resource Managament

From Space to Field: Demonstrating EO-Based Water Productivity Monitoring in Australia

Moving from EO foundations to practical demonstration

This edition moves one step further demonstrating how Copernicus-powered satellite data can support practical water productivity benchmarking for irrigated agricultural systems.

Through collaboration with Australian stakeholders and industry partners, the project has tested how Earth Observation (EO) data can replicate and complement traditional water productivity benchmarking approaches.

Using Copernicus EO data, meteorological datasets, hydrological modelling, and locally calibrated information, WaterSENSE | REINFORM is helping transform complex water monitoring into scalable, repeatable, and regionally consistent indicators.

The work focuses on cotton-growing regions in New South Wales, Australia, where water availability, irrigation management, and sustainability reporting are increasingly important.

Why new approaches to water productivity benchmarking are needed

Traditional water productivity benchmarking provides valuable insights for growers, irrigation operators, and the broader cotton industry. However, these approaches often rely on labour-intensive surveys, manual data collection, and ongoing grower participation, making it challenging to maintain consistent benchmarking across large regions and multiple seasons.

WaterSENSE | REINFORM explores how Earth Observation (EO) can complement these existing approaches by providing scalable, repeatable, and transparent monitoring at regional scale.

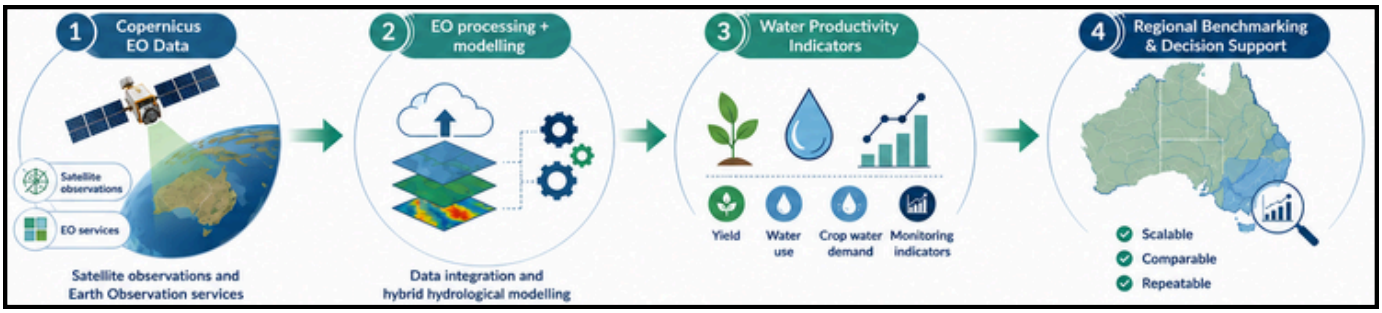
Using Copernicus EO data and meteorological datasets, combined in physical models and calibrated using local information, estimates can be made regarding:

- irrigation water use
- cotton yield
- water productivity indicators
- crop water demand

The workflow below illustrates how EO data is transformed into practical benchmarking insights that support more consistent and scalable water productivity assessment across Australian agricultural systems.

Here is what Earth Observation can deliver

EO-derived benchmarking reproduced broader seasonal trends observed in existing industry benchmark datasets while providing scalable regional insights.



How Earth Obervation supports scalable water productivity monitoring.

EO-based benchmarking at catchment scale

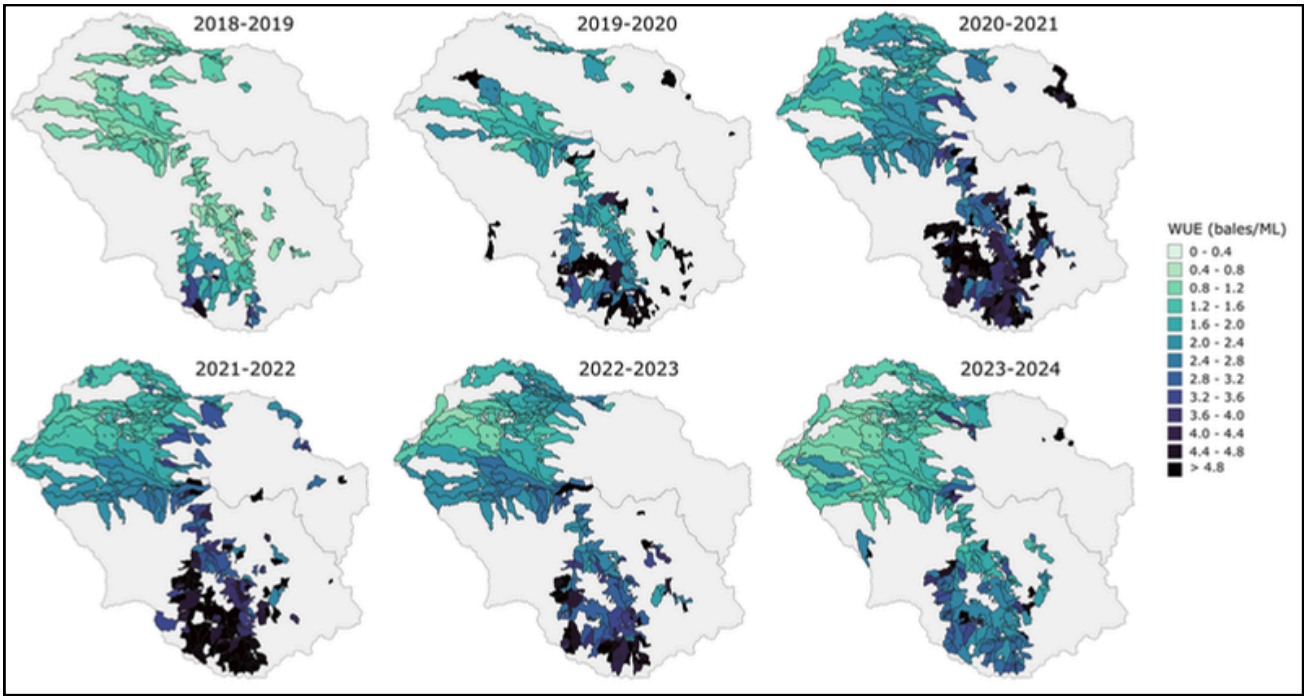
The demonstration activities focused on cotton-growing catchments in New South Wales, Australia, including the Namoi and Gwydir regions two areas where irrigation management and water productivity are critically important.

Using EO data and physical modelling, the project generated regional-scale estimates of irrigation water use and water productivity across multiple growing seasons.

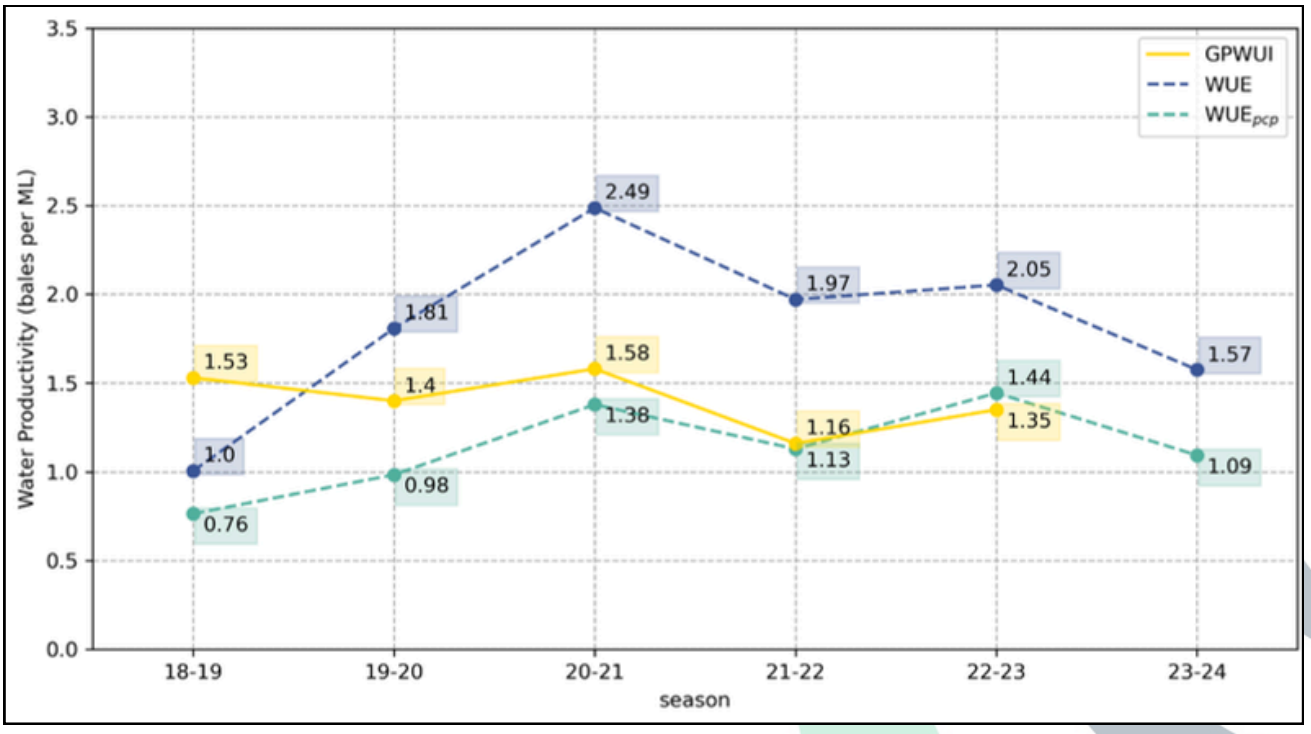
The results showed that EO-derived benchmarking can successfully reproduce broader trends observed in existing industry benchmark datasets.

Together, these results demonstrate that:

- satellite-based monitoring can estimate irrigation water use at scale
- spatial variability in water productivity can be visualised
- benchmarking can be repeated consistently across seasons and regions



Regional-scale assessment of water productivity variability across Australian cotton-growing catchments.



EO-derived benchmarking reproduced broader seasonal trends observed in existing industry benchmark datasets across Northern NSW.

When comparing the EO-based water productivity outputs with industry reports, there is a strong agreement in trends when including effective rainfall in the EO-based water productivity indicators (WUEpcp). Water productivity estimates excluding effective rainfall (WUE) are generally higher, because a grower is not penalised for using naturally available water. This marks the importance of having clear definitions around water productivity indicators.

Growing interest from irrigation operators and industry stakeholders

Stakeholder engagement undertaken during the project highlighted growing interest in EO-derived datasets and benchmarking products across the Australian irrigation sector.

Stakeholders identified particular value in:

- rainfall products
- evapotranspiration monitoring
- crop water demand indicators
- scalable regional benchmarking

The integrated EO-derived products illustrated below demonstrate how multiple datasets can work together to support benchmarking activities and practical operational applications.

EO-based information can support:

- operational planning
- sustainability reporting
- water governance
- benchmarking and certification discussions

This feedback confirms that Earth Observation has strong potential not only for reporting, but also for practical decision-support applications.

Copernicus Corner

Turning satellite data into water productivity insights

Copernicus remains the backbone of WaterSENSE | REINFORM's monitoring approach, providing the Earth Observation infrastructure that enables scalable and repeatable water productivity assessment across Australian agricultural regions.

This benchmarking demonstration primarily relies on:

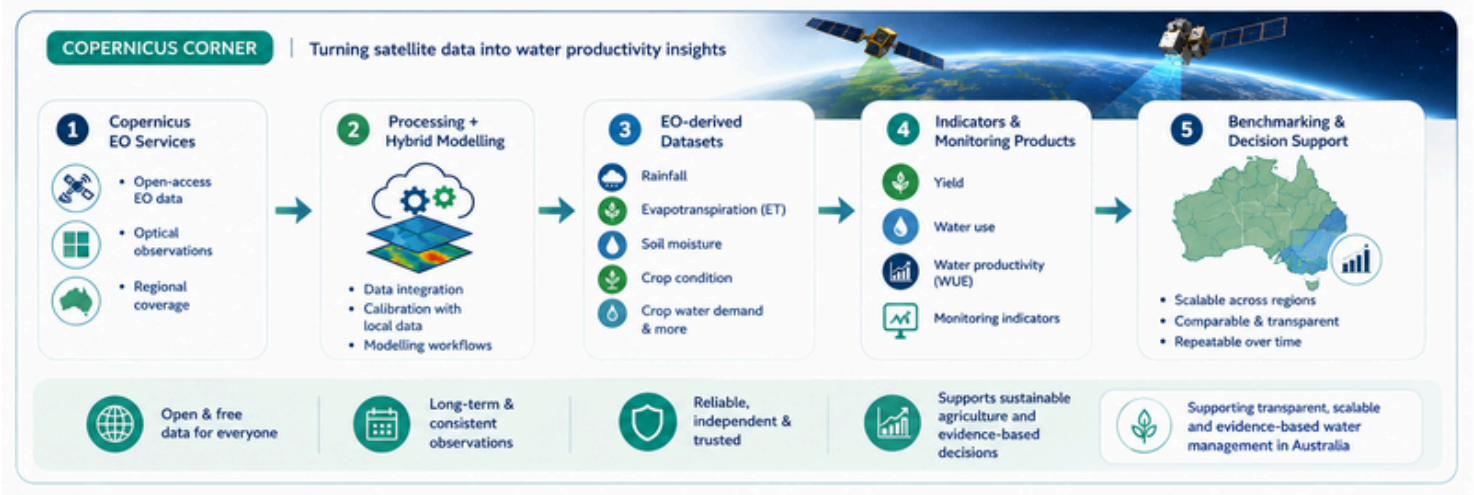
- Copernicus Earth Observation services
- Sentinel-2 optical imagery
- global meteorological datasets
- local information on cotton yield and water use

The workflow below shows how Earth Observation data can be transformed into practical benchmarking insights and monitoring products.
Copernicus enables:

- repeatable monitoring across seasons
- scalable regional analysis
- transparent and harmonised datasets
- long-term sustainability assessment

Within WaterSENSE | REINFORM, complementary activities undertaken by The University of Sydney, HydroLogic, and Hidromod contribute to the development of hybrid hydrological modelling approaches and monitoring workflows that support broader assessments of water availability, irrigation dynamics, soil moisture conditions, and operational water management applications.

Together, these approaches strengthen WaterSENSE | REINFORM's ability to move from benchmarking toward integrated monitoring and decision-support systems.



Through WaterSENSE | REINFORM, Copernicus data is being translated into practical tools that support water-smart agriculture and evidence-based water management.

From demonstration to pilot implementation

Following the successful proof-of-concept phase, WaterSENSE | REINFORM is now moving from demonstration activities toward pilot implementation and operational readiness across Australian irrigation regions.

If granted, the next phase of the project will focus on expanding stakeholder engagement and validating EO-based benchmarking approaches under real operational conditions. This includes:

- expanded stakeholder testing,
- pilot benchmarking activities,
- and operational demonstrations across Australian irrigation systems.

Upcoming activities will focus on:

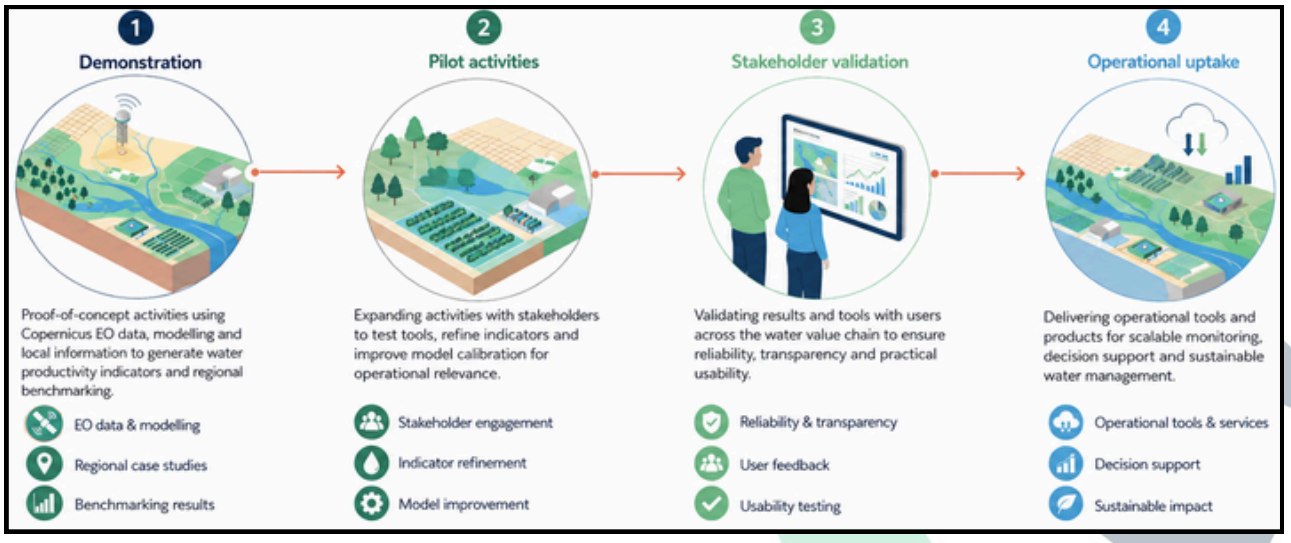
- validating EO-based indicators with stakeholders
- improving model calibration and regional consistency
- supporting sustainability and reporting frameworks
- exploring operational applications for irrigation management and benchmarking

The roadmap below illustrates the project's progression from EO-based demonstration activities toward scalable operational uptake and practical implementation.

The next phase of the project will continue exploring how Earth Observation can support more transparent, scalable, and sustainable water management across Australian agriculture.

From demonstration to operational uptake

WaterSENSE is moving from proof of concept activities to pilot implementation and operational uptake, building the foundation for long-term, scalable water monitoring and decision support.



Stay connected

If these topics resonate with you, whether you're a grower, water manager, or sustainability lead, follow us on LinkedIn and reach out. Looking for more information? We'll be sharing results from our upcoming demonstrations, practical tools, and opportunities to collaborate across Australia's water-smart agriculture community.

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