Managing freshwater (teal carbon) ecosystems for carbon and biodiversity benefits

Regional Circular Economy Summit, Bass Coast

Presenter: Dr Martino E. Malerba

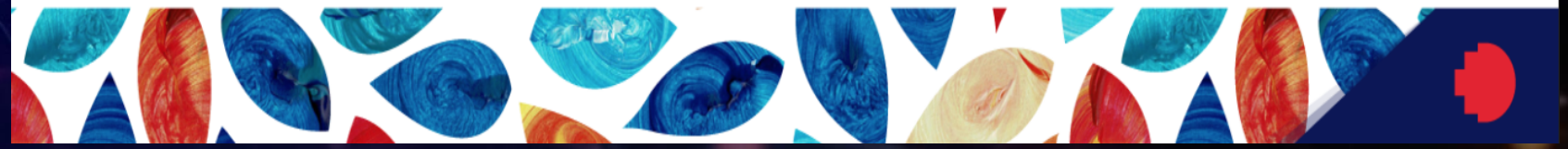
RMIT UNIVERSITY Centre for Nature Positive Solutions

CRICOS provider number: 00122A | RTO Code: 3046

Acknowledgement of country

We would like to acknowledge the people of the Woi wurrung and Boon wurrung language groups of the eastern Kulin Nations on whose unceded lands we conduct the business of the University. We respectfully acknowledge their Ancestors and Elders, past, present and emerging.

We would also like to acknowledge the Traditional Custodians and their Ancestors of the lands and waters across Australia where we conduct our business.





RMIT UNIVERSITY

Centre for Nature Positive Solutions

Research that makes a difference

Understanding and using nature-based solutions to help mitigate climate change and promote a sustainable world.

RMIT Classification: Trusted

Director



Prof Peter Macreadie

Senior Lecturers



Dr Tanveer Adyel



Dr Stacey Trevathan-Tackett



Dr Martino Malerba



Dr Paul Carnell

Senior Research Fellows



Dr Melissa Wartman



Dr Maria Palacios



Dr Micheli Costa

Technical Officers

Outreach Officer



Dr Siegmund Nuyts



Dr Lukas Schuster



Dr Jacqui Pocklington



Dr Rifaee Rasheed



Dr Kristian Bell



Dr Roshan Sharma



Dr Omosalewa Odebiri



Dr. Anirban Akhand



Dr Noyan Yilmaz



Dr. Pawel Waryszak



Dr Nicole Mertens

Research Officers



Phebe Rowland



Sabrina Olsson

Research Assistants



Jasmine Bursic



Rory Crofts



Joshua Glen



Tallulah Davey



Christopher Bie



Kendrika Gaur



Liz Galanis



Teah Coate

Research Students



Rocío Araya



Alexandra Rodríguez



Nipuni Perera



Nataly Guevara



Finnley Ross



Mohammad Abu Noman



Derrick Omollo



Wenzhen Zhao



Agustina Quadri Adrogué



Ahalya Suresh

RMIT Classification: Trusted

TACKLING THE BIG ISSUES FACING

PEOPLE & PLANET

RMIT UNIVERSITY

Centre for Nature Positive Solutions



BLUE CARBON

Managing coastal wetlands for maximum carbon sequestration.



TEAL CARBON

Quantifying the carbon sink capacity of freshwater wetlands and identifying management practices to mitigate carbon emissions.



CITIZEN SCIENCE

Empowering communicates to fight climate change, while contributing to wetland research.



ECOSYSTEM RESTORATION

Preparing and adapting to the impacts of climate change and urban development on our wetlands.



MARINE BIOSECURITY

Preventing and responding from pests and diseases that threaten Australia's marine environment.



NATURAL CAPITAL

Tracking changes in ecosystems and measuring the benefits they provide to people, to support smart decision making and investments.



BIODIVERSITY

The science to inform decision making and quantify the biodiversity benefits of improved management.



FISHERIES

Managing aquatic ecosystems for optimal environmental outcomes.



DECOMMISSIONING OIL & GAS INFRASTRUCTURE

Optimal environmental outcomes for decommissioning of obsolete offshore oil and gas infrastructure.



MICROPLASTICS

Quantifying the sequestration of microplastics in Australia's coastal wetlands and modelling their impacts.



SEAWEED

Research to inform management of natural ecosystems and support the upscaling of seaweed industries.



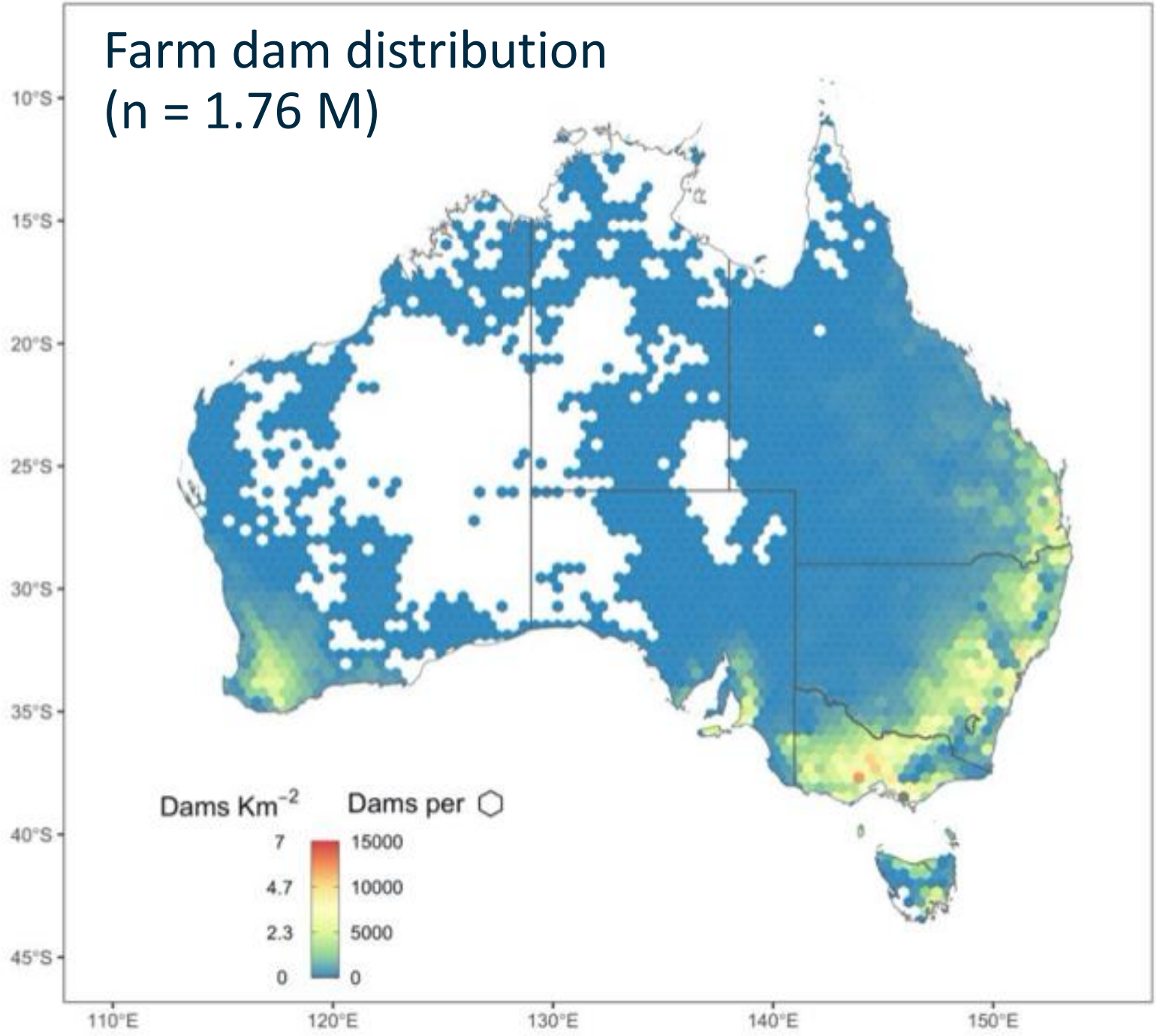
COASTAL PROTECTION

Managing and adapting coastal wetlands to protect and enhance our coastlines


TEAL CARBON



Farm dam distribution (n = 1.76 M)



Malerba et al. 2021
Remote Sensing

RMIT Classification: Trusted

Farm dams

RMIT UNIVERSITY

Centre for Nature Positive Solutions

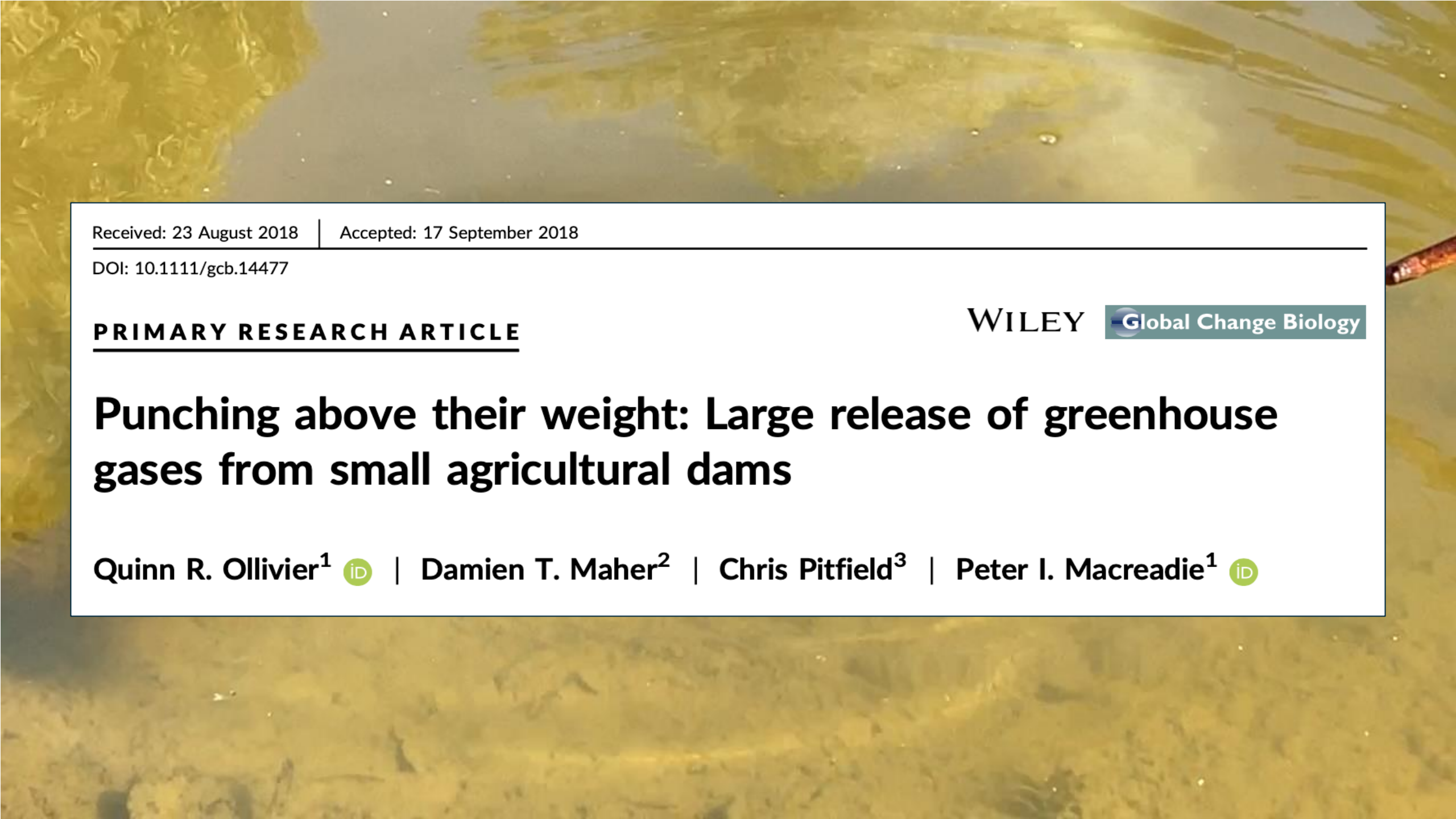


Carbon footprint

Biodiversity

Cost-benefit analysis





Received: 23 August 2018 | Accepted: 17 September 2018

DOI: 10.1111/gcb.14477

PRIMARY RESEARCH ARTICLE

WILEY Global Change Biology

Punching above their weight: Large release of greenhouse gases from small agricultural dams

Quinn R. Ollivier[1] | Damien T. Maher[2] | Chris Pitfield[3] | Peter I. Macreadie[1]





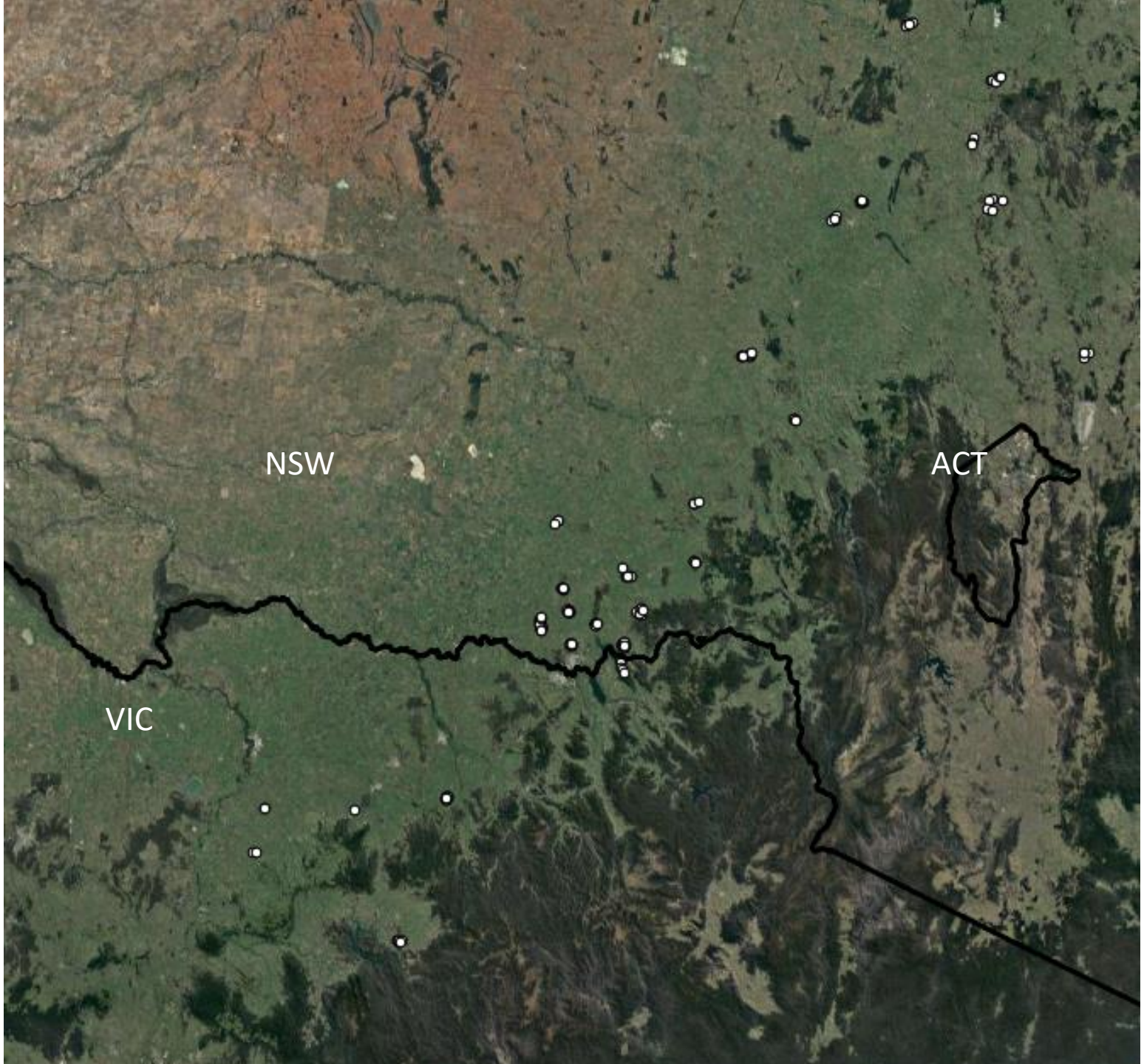






RMIT Classification: Trusted




NSW
ACT
VIC

RMIT Classification: Trusted

Unmanaged farm dam (control)

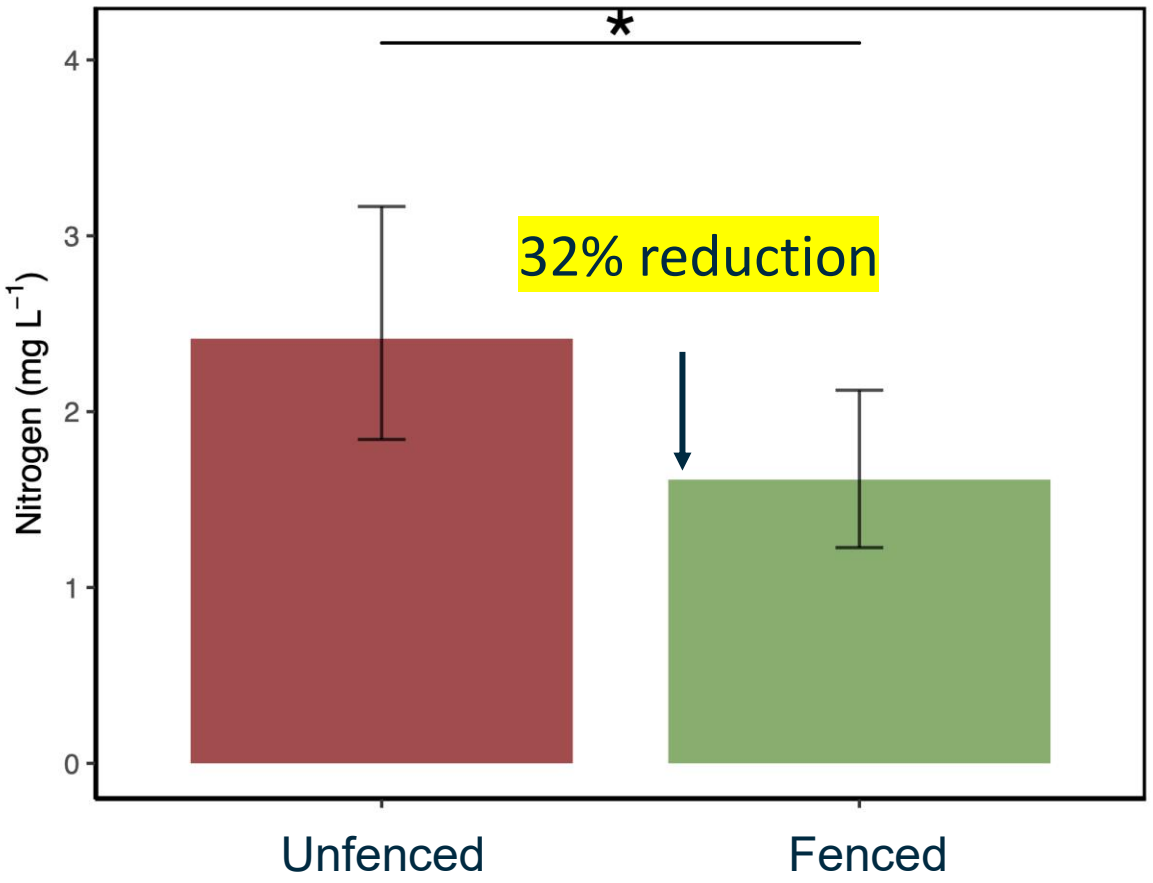


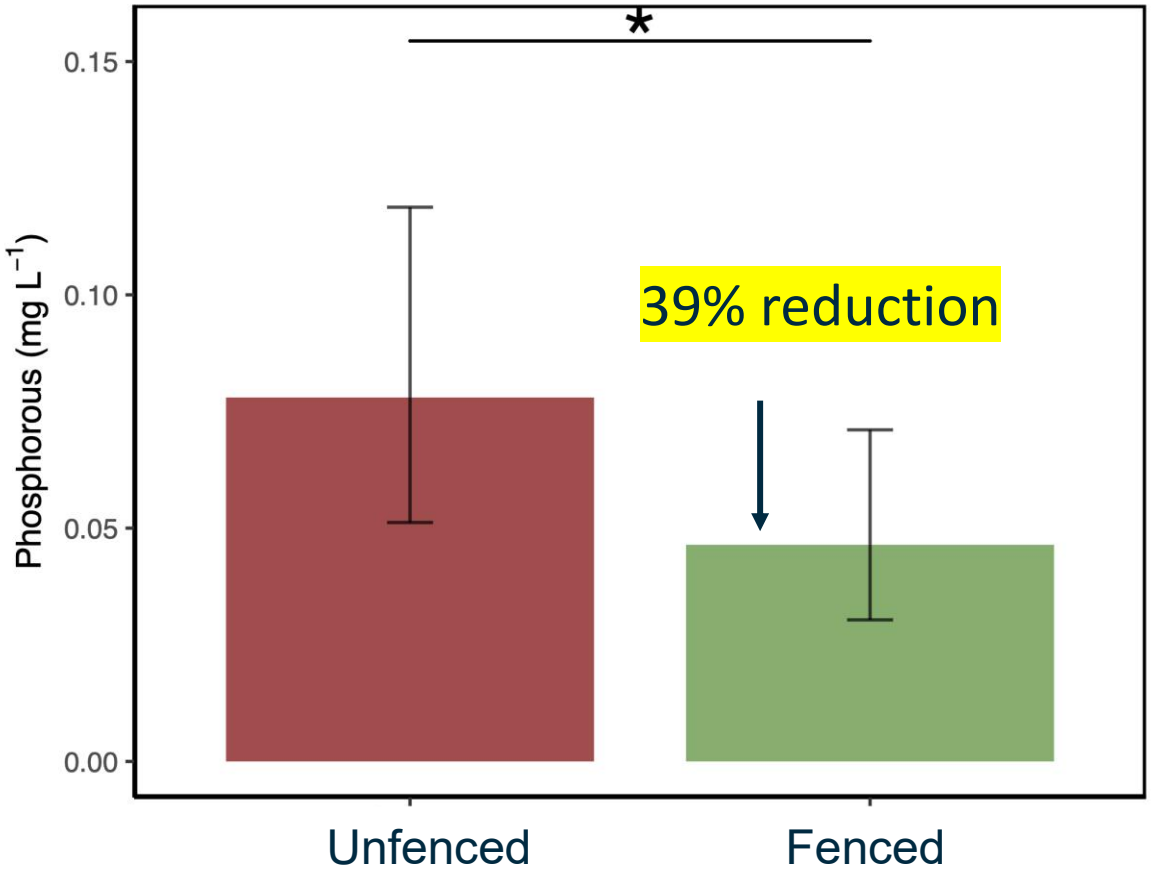
Managed farm dam (enhanced/fenced)



RMIT Classification: Trusted

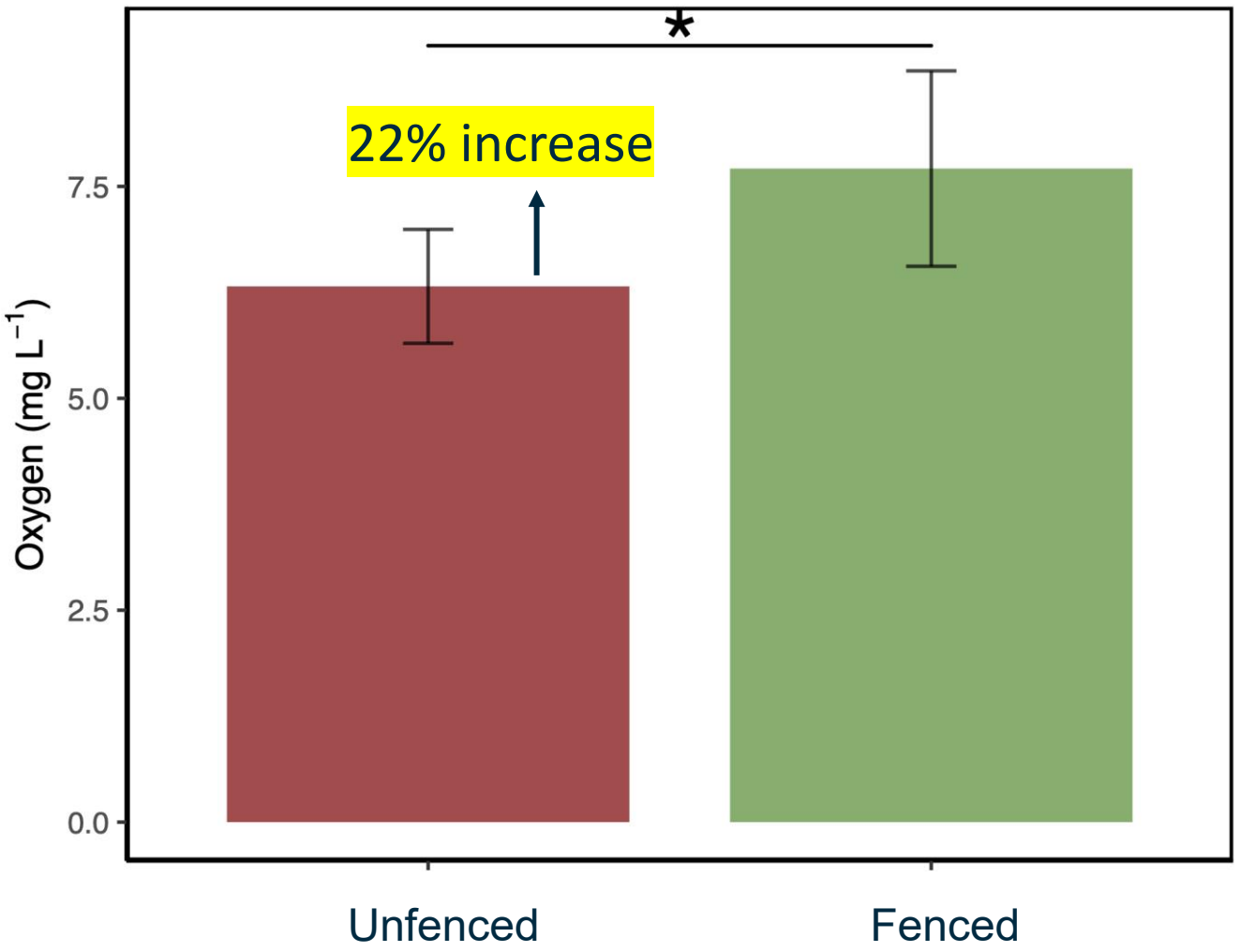
Improvement in water quality





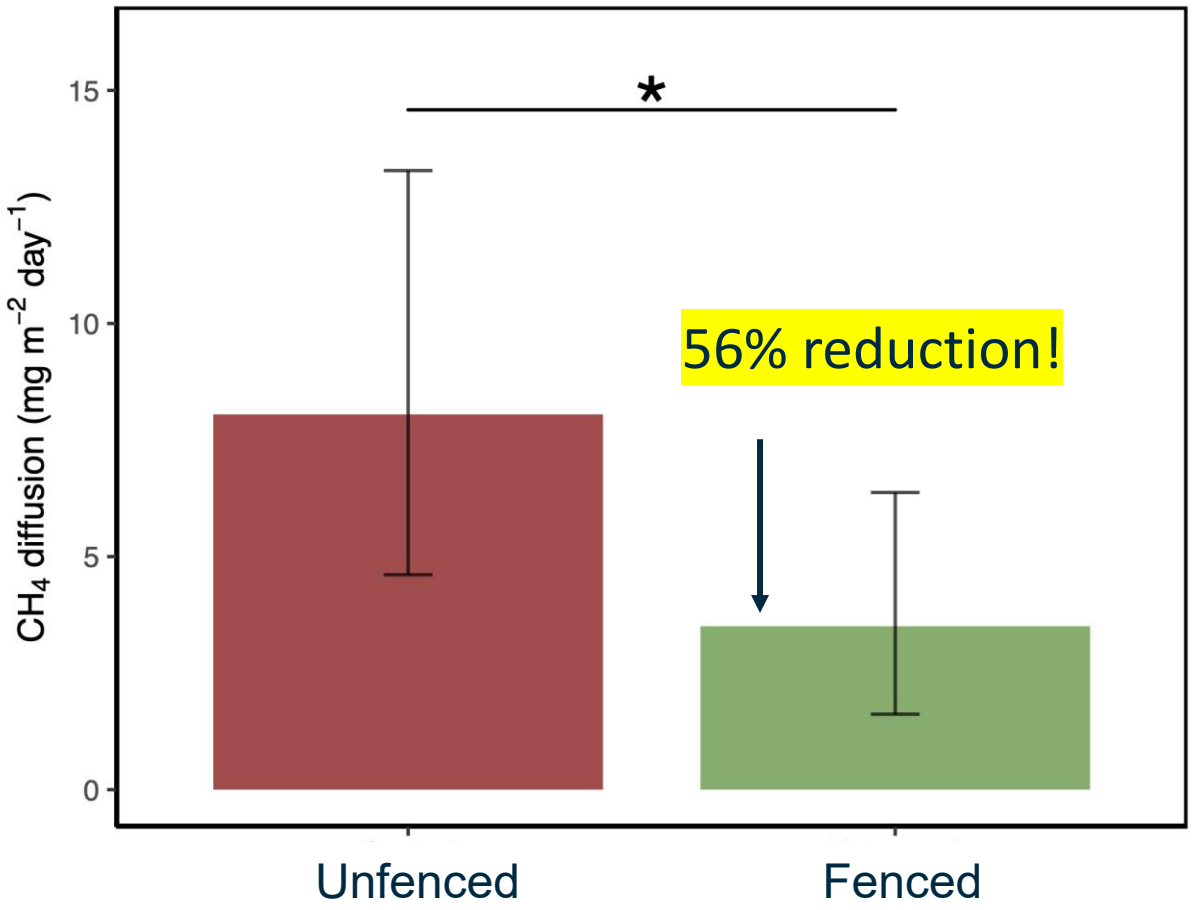
RMIT Classification: Trusted

Improvement in water quality

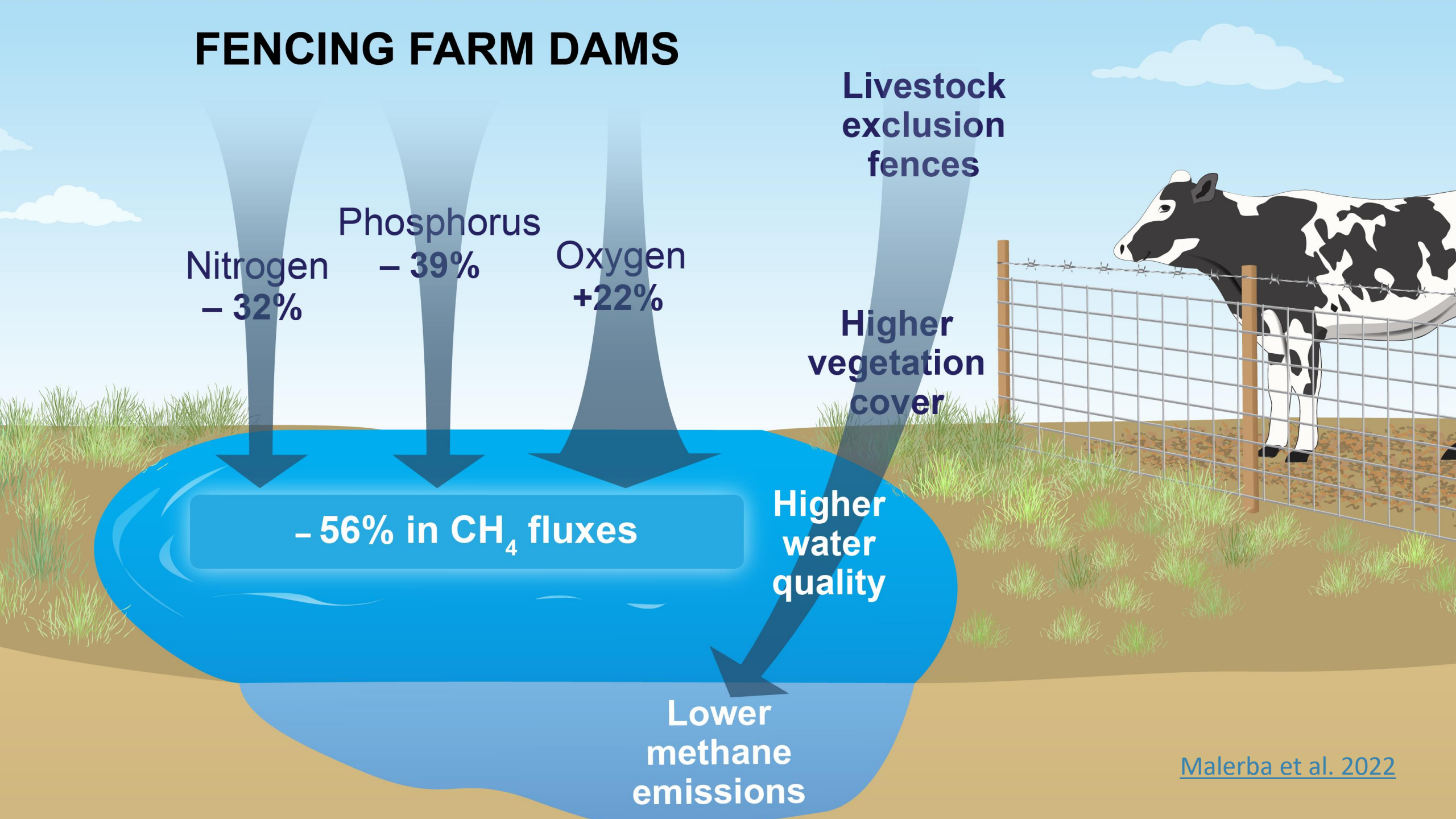


RMIT Classification: Trusted

Reduction in GHG emissions



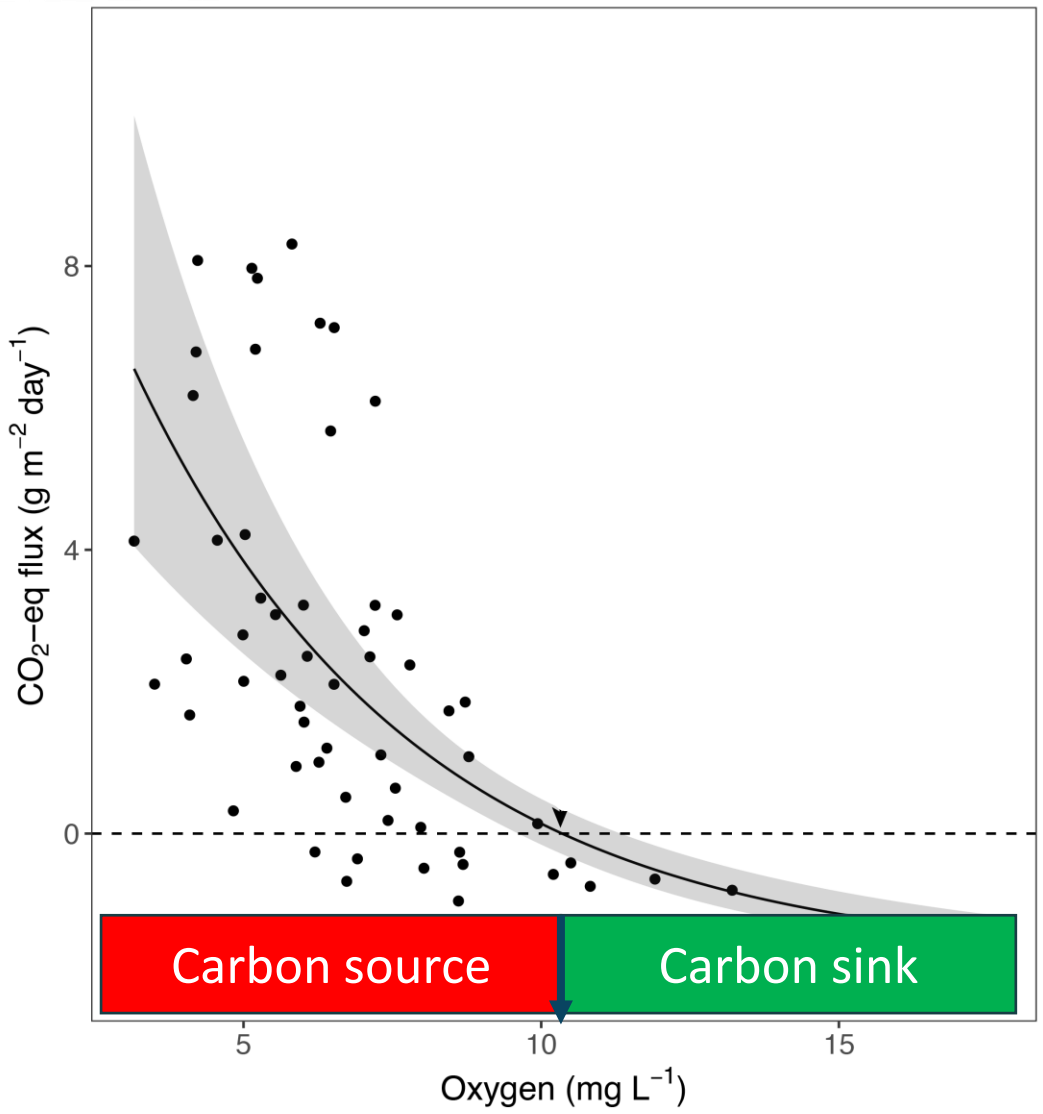
FENCING FARM DAMS



Malerba et al. 2022

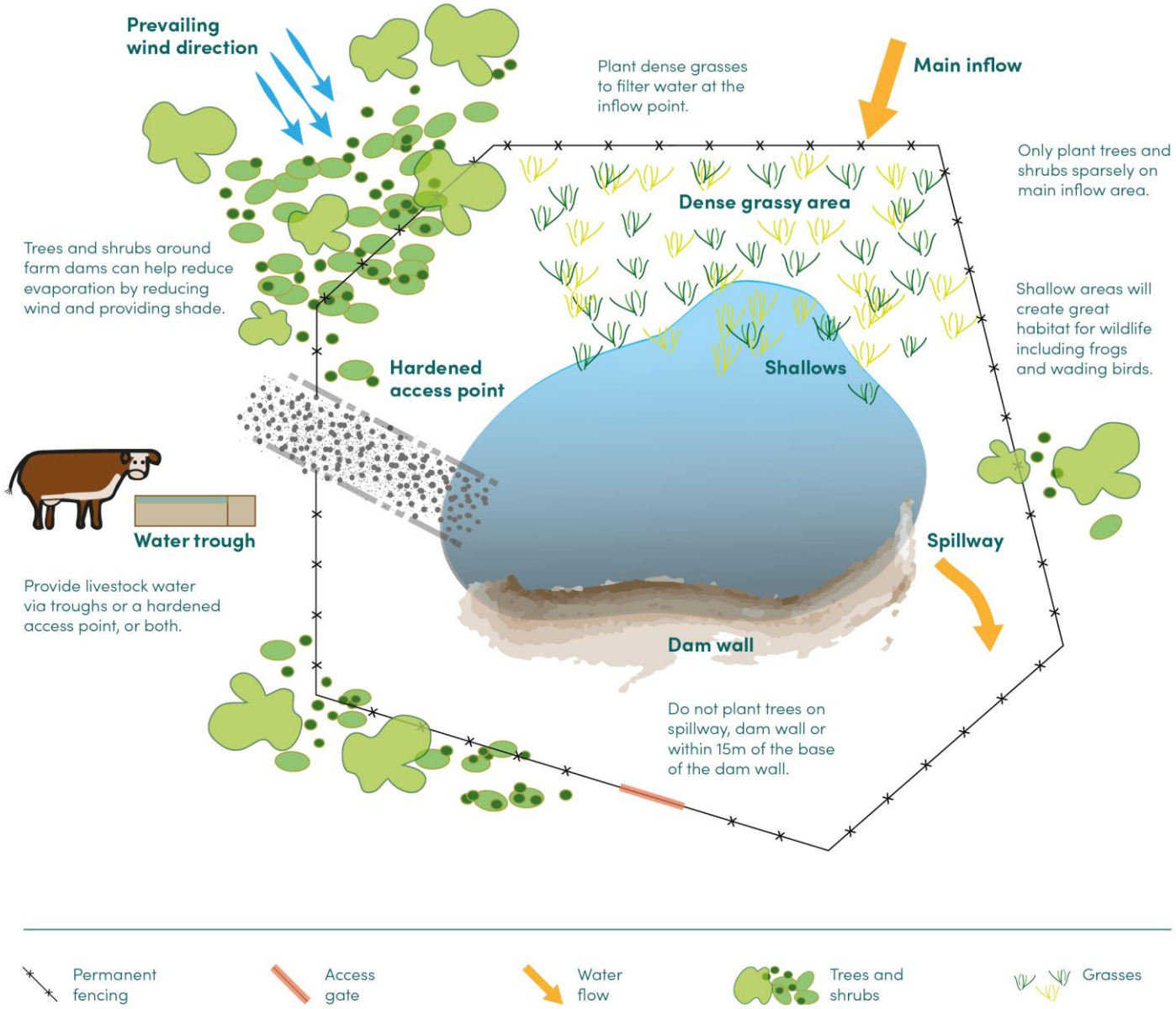
RMIT Classification: Trusted

Improvement in water quality



RMIT Classification: Trusted

Farm dam management





SUSTAINABLE FARMS

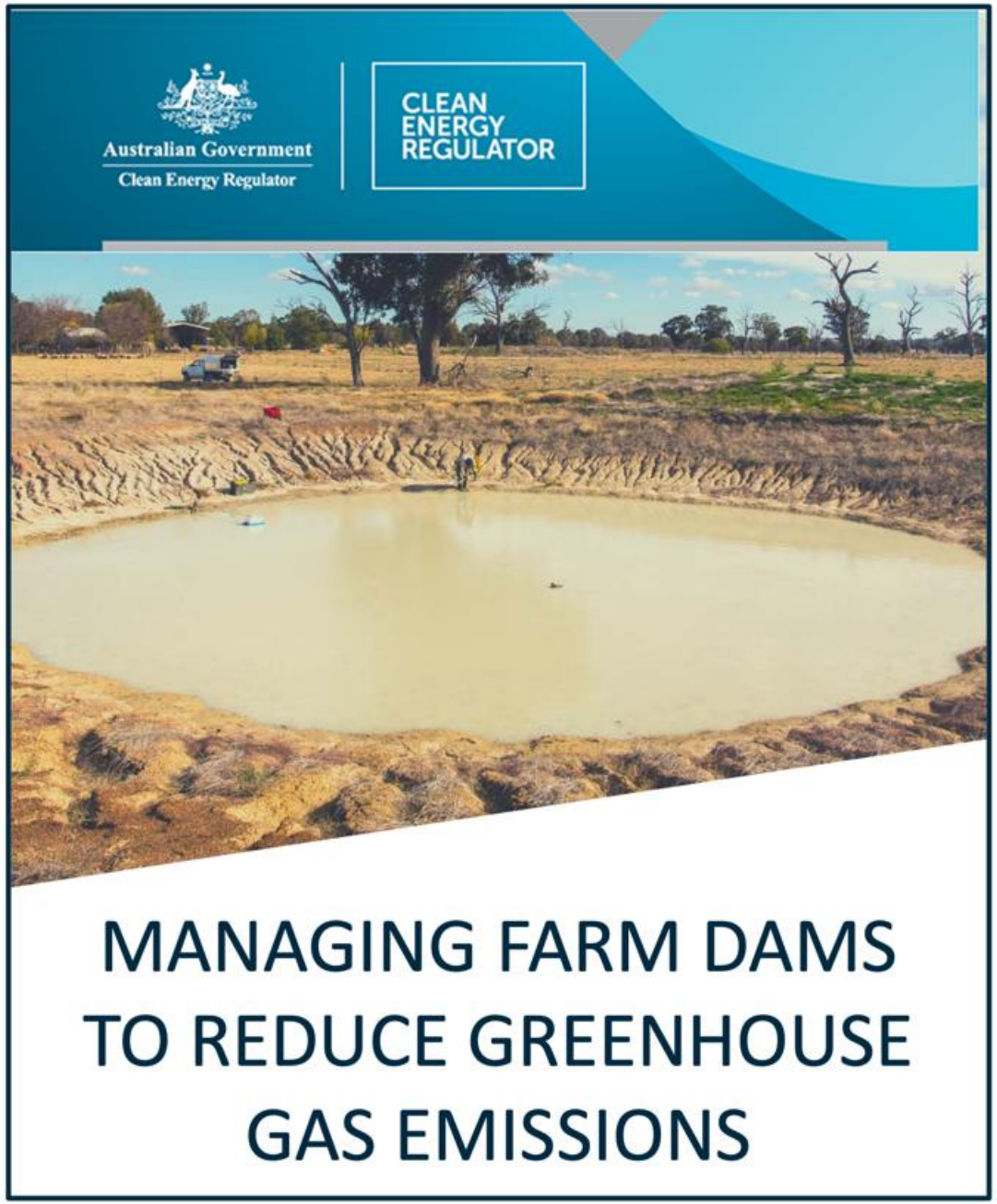
Australian National University

RMIT Classification: Trusted

Outputs

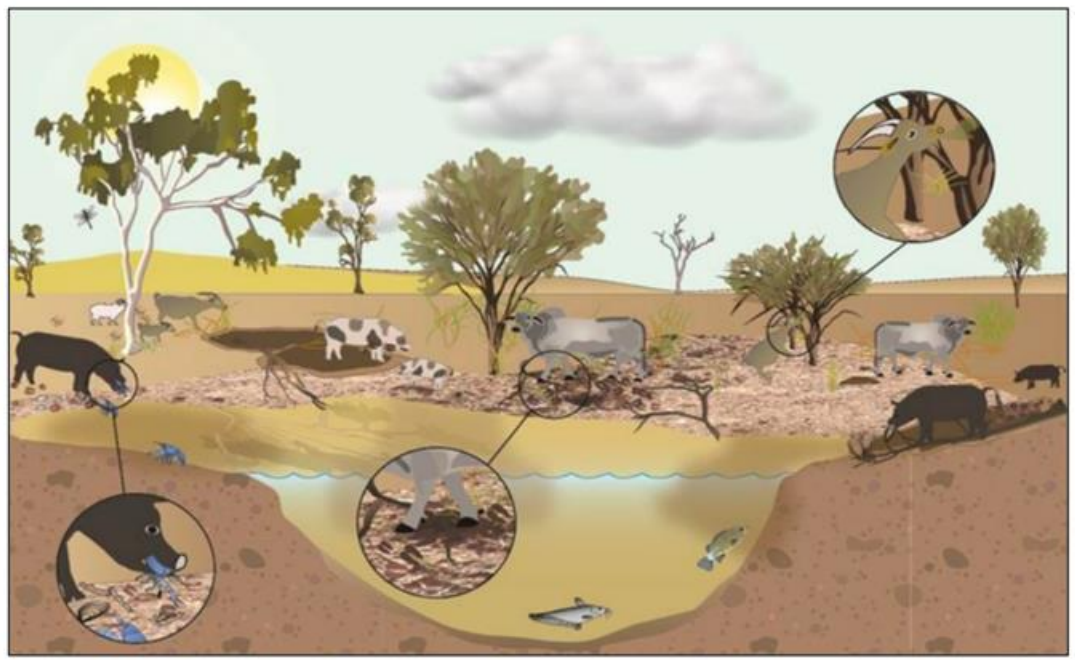


RMIT Classification: Trusted



ACCU Method Development

1. *Ungulate Exclusion Method*
2. *Integrated Farm and Land Method*





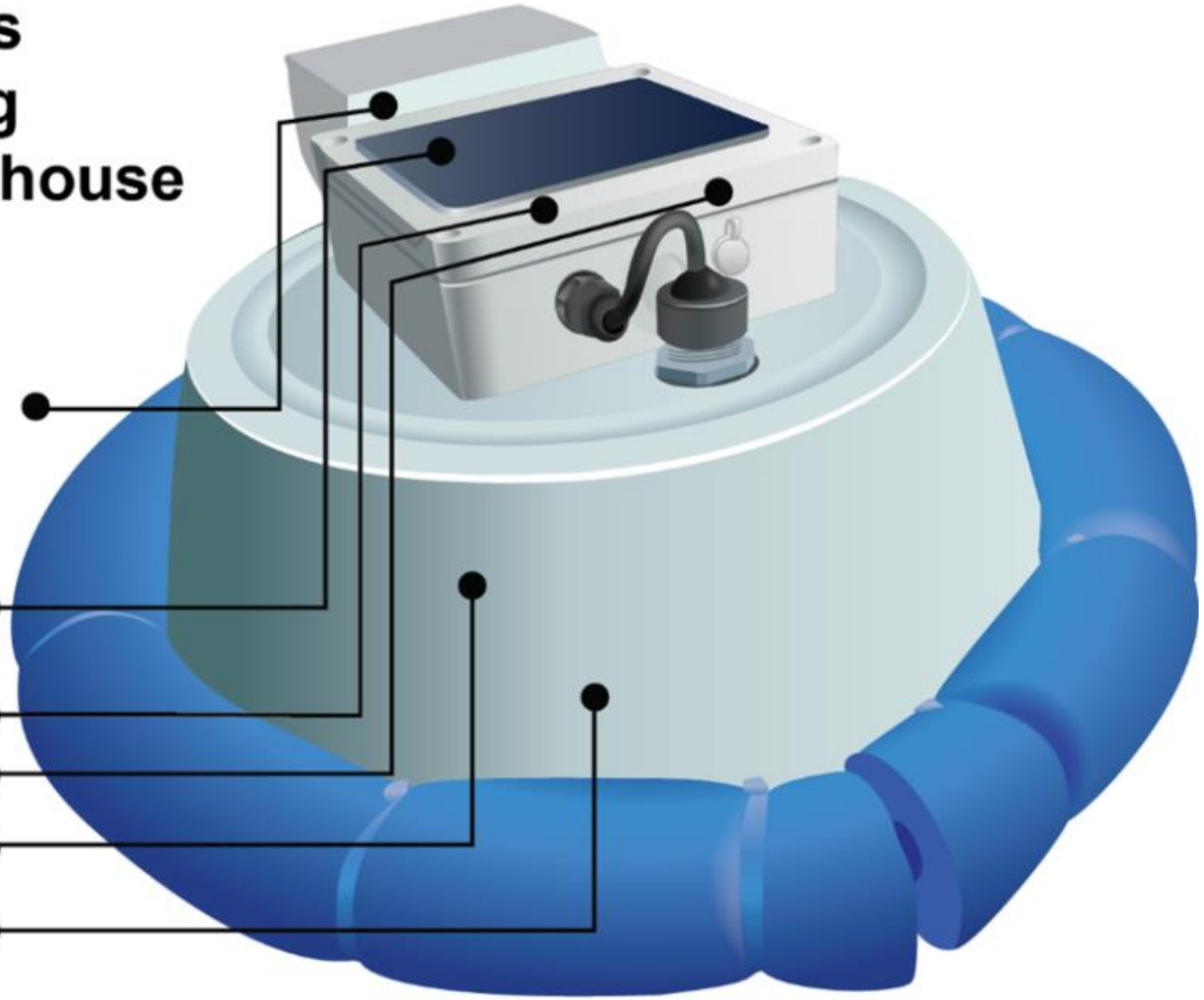




RMIT Classification: Trusted

Pondi sensors for monitoring aquatic greenhouse gases

- Cloud backend for monitoring the devices.
- Internet connectivity for real-time data access.
- Solar panel and battery for continuous recording.
- Gyroscope to monitor orientation and movements
- GPS for localization
- Sensors for temperature, humidity, and pressure.
- Greenhouse gas sensors for carbon dioxide, methane, and nitrous oxide.

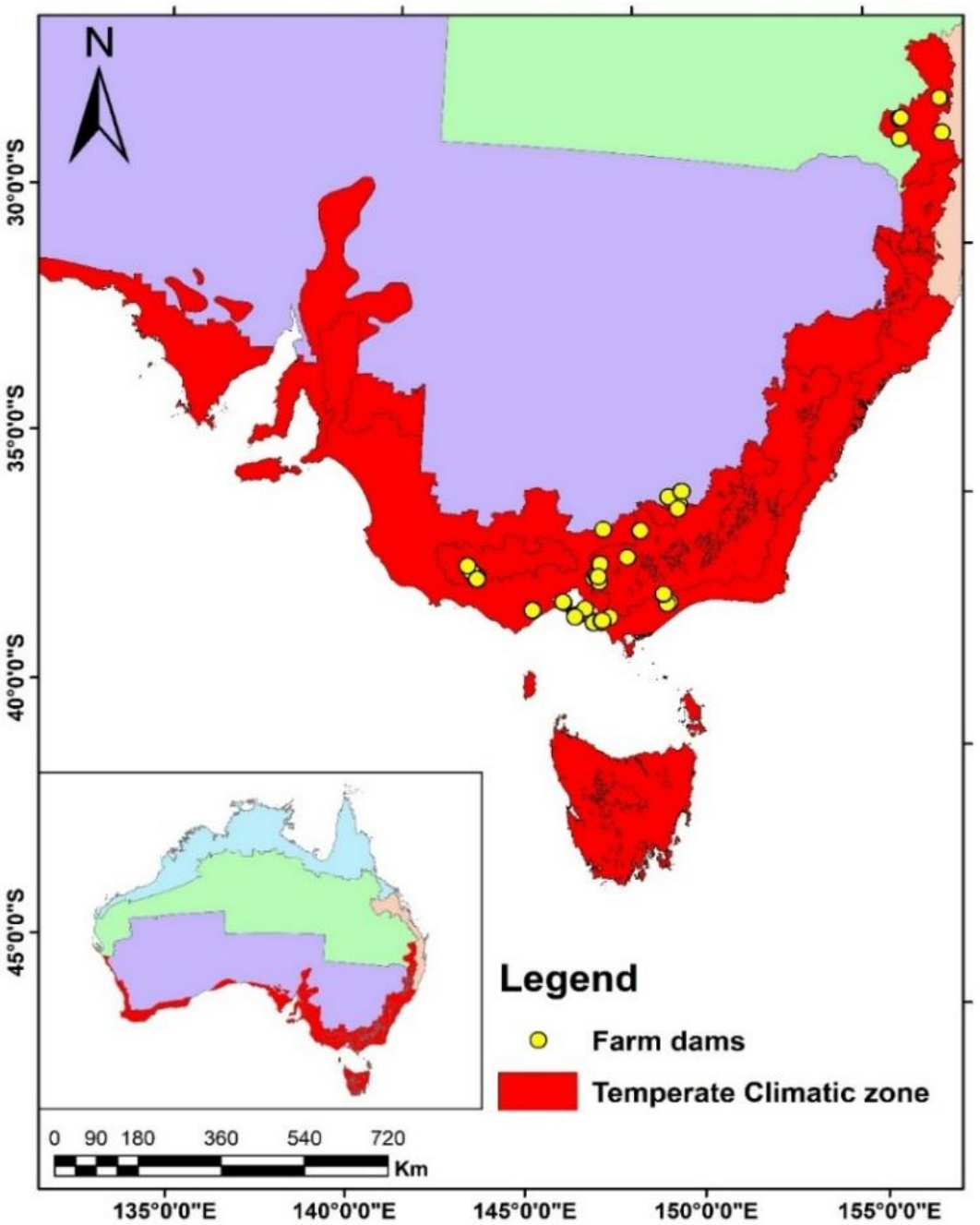


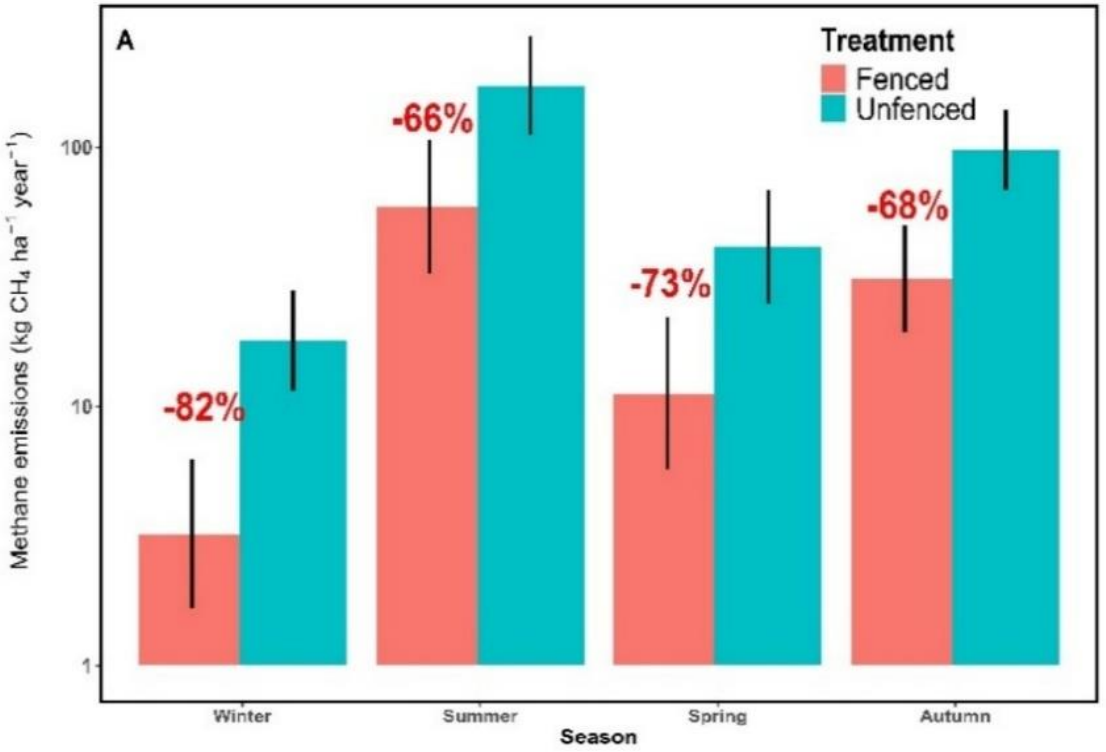

Blue Carbon Lab

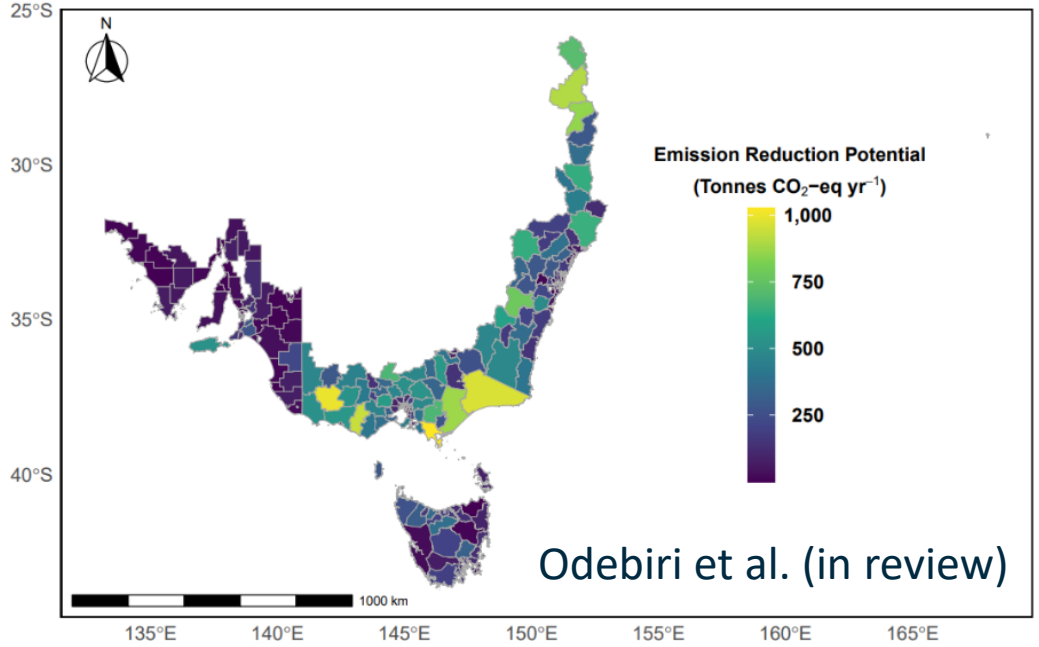
RMIT Classification: Trusted



RMIT Classificat

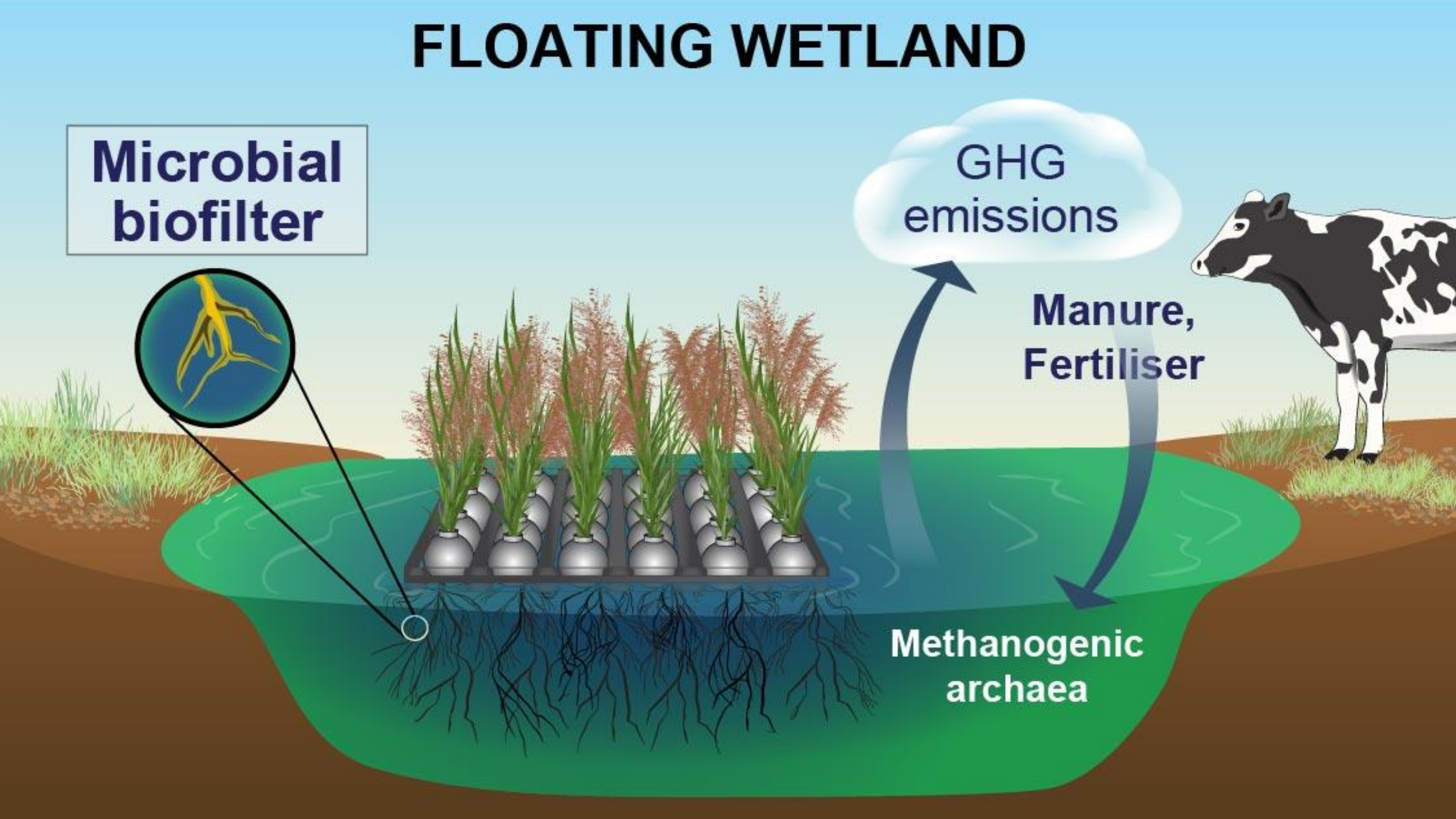






Odebiri et al. (in review)

FLOATING WETLAND











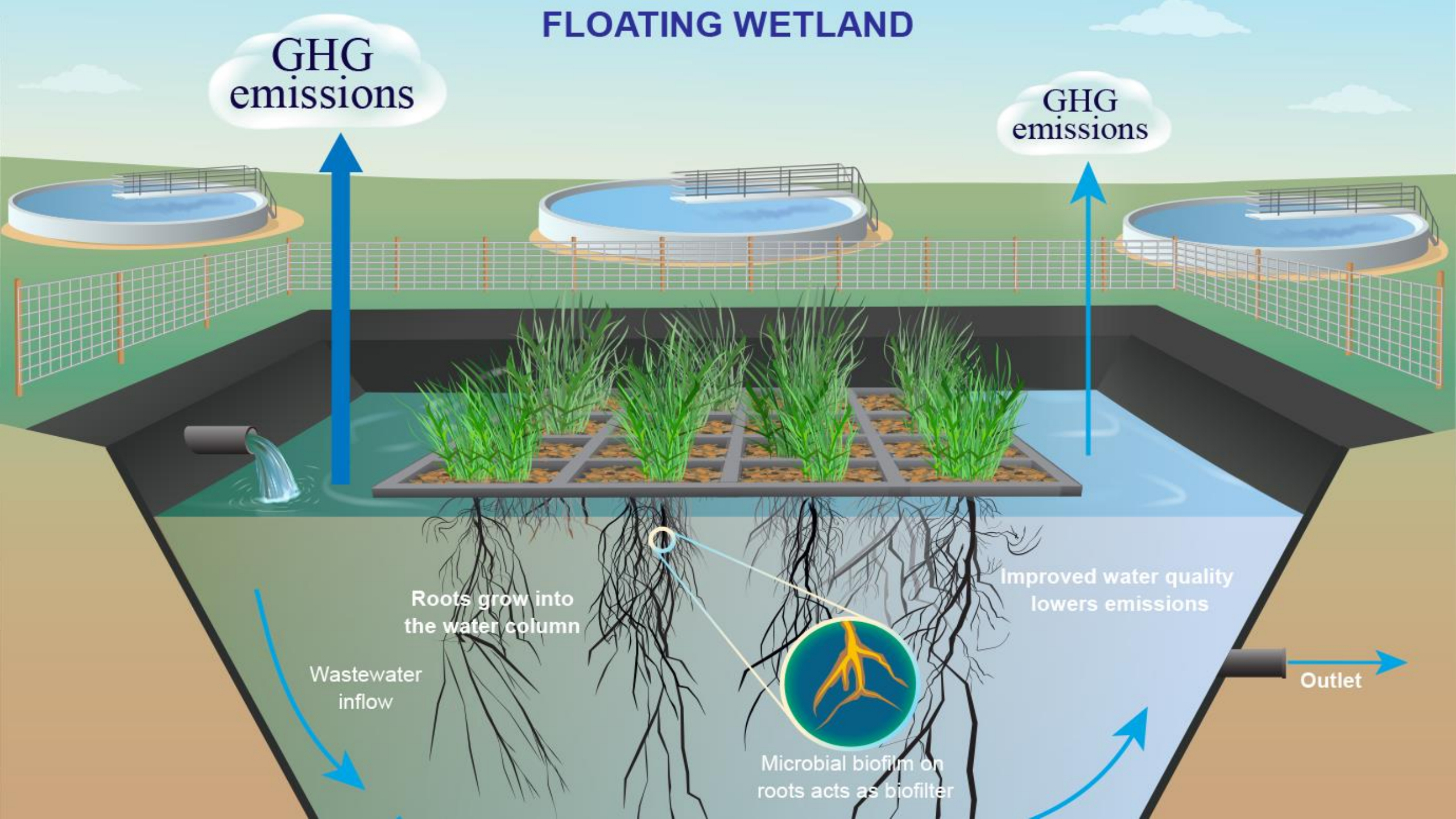
RMIT Classification: Trusted










FLOATING WETLAND
GHG emissions
GHG emissions
Roots grow into the water column
Improved water quality lowers emissions
Wastewater inflow
Outlet
Microbial biofilm on roots acts as biofilter

VICTORIA State Government | Energy, Environment and Climate Action

WESTERNPORT WATER™

CLARITY AQUATIC

COVEY ASSOCIATES PTY LTD Consulting Engineers

CSIRO

DEAKIN UNIVERSITY

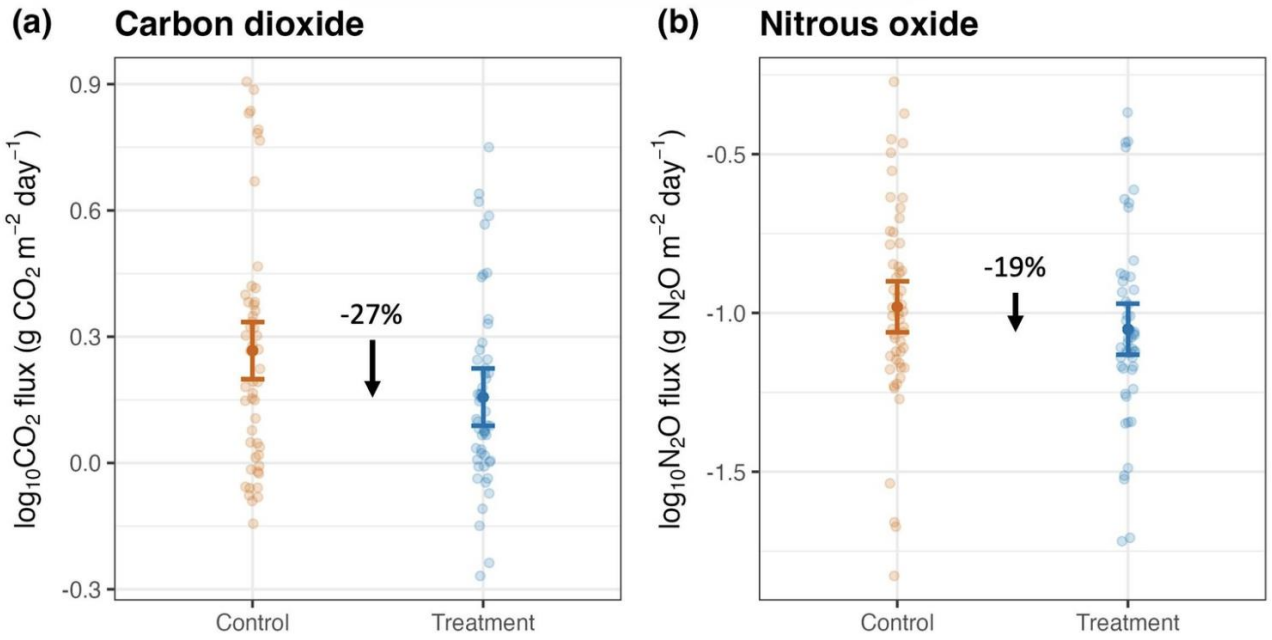
Blue Carbon Lab

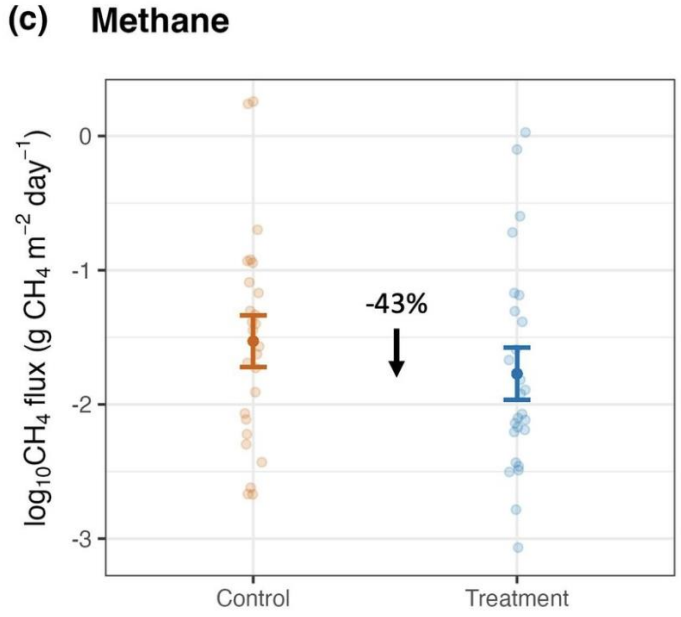


RMIT Classification: Trusted

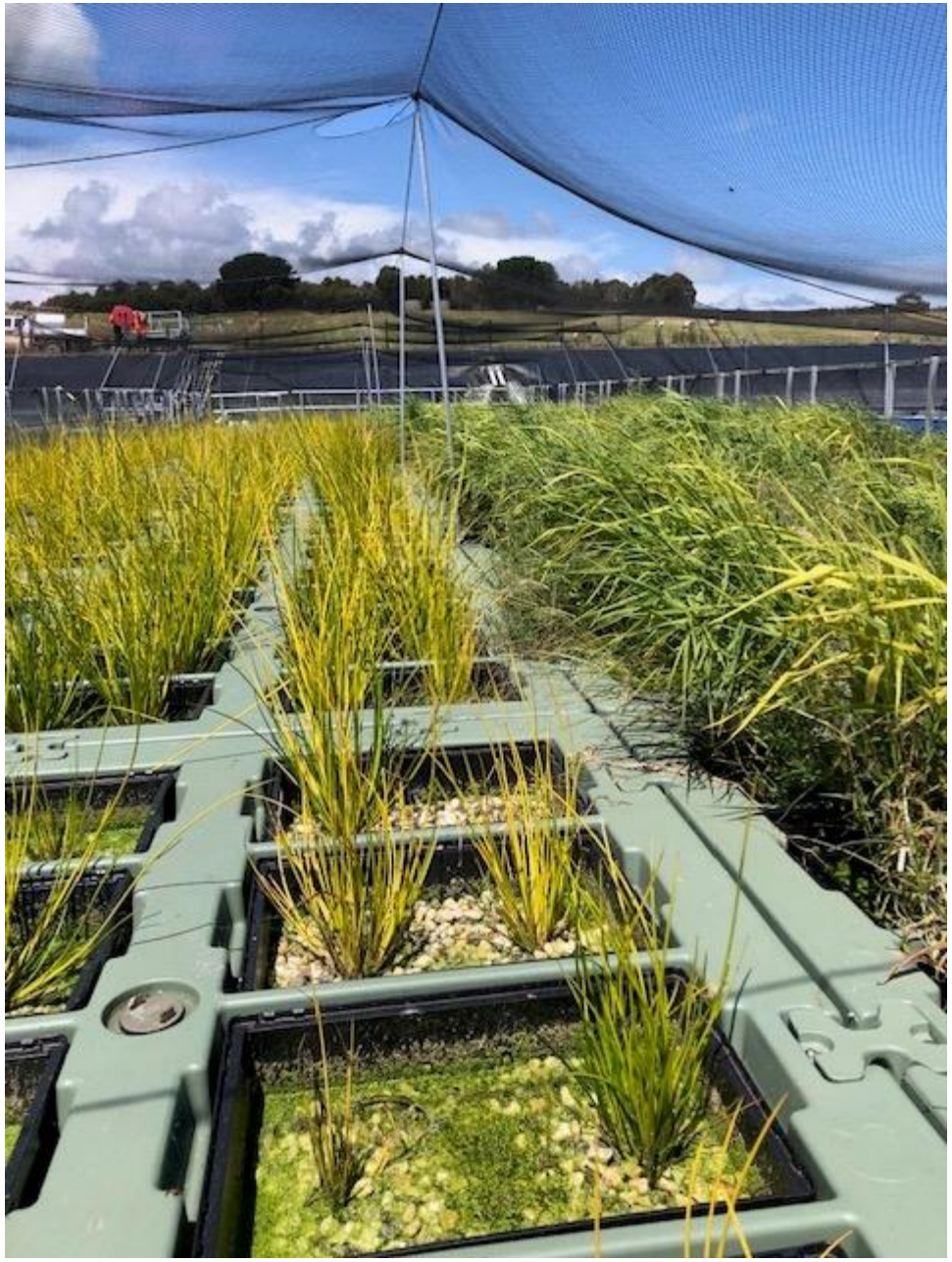
GHG emissions





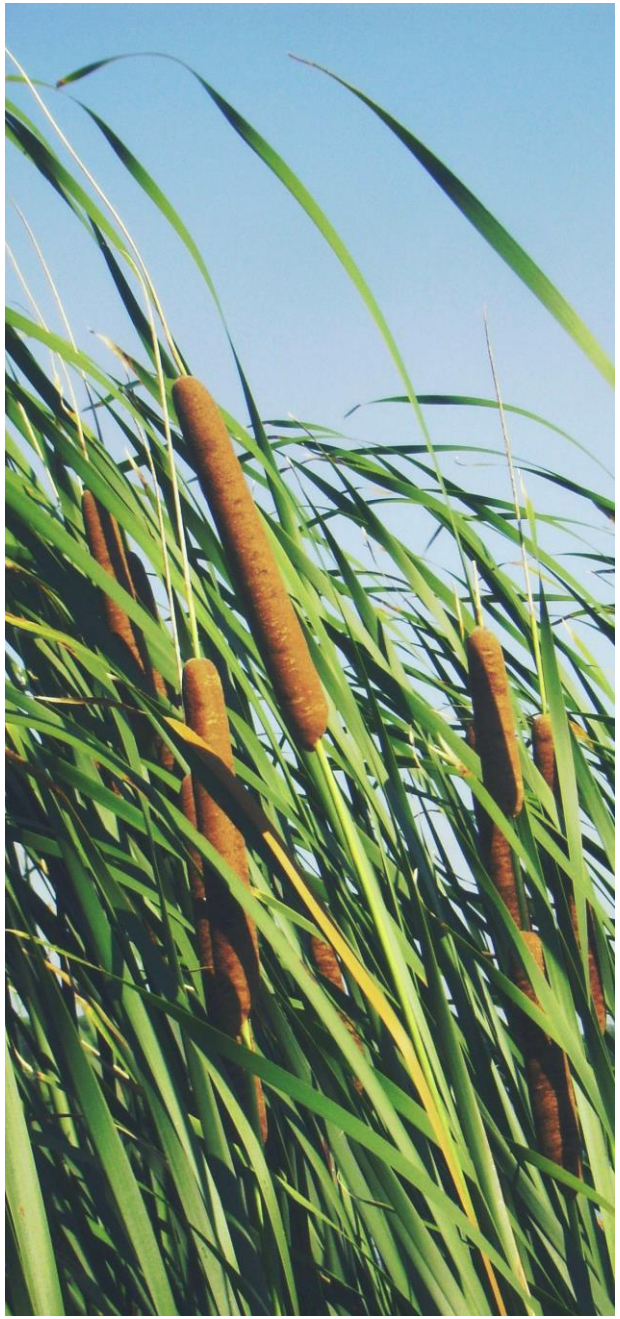


RMIT Classification: Trusted





RMIT Classification: Trusted











https://neomatter.bio

RMIT Classification: Trusted



Ways to improve natural assets on a farm

Enhance farm dams

SUSTAINABLE FARMS



Martino Malerba (Martino.Malerba@rmit.edu.au)

PhD scholarships available in my lab

RMIT UNIVERSITY

DEAKIN UNIVERSITY

SUSTAINABLE FARMS

Australian Government
Australian Research Council

Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

Australian National University

CLARITY AQUATIC

CORANGAMITE CMA

Dja Dja Wurrung Clans Aboriginal Corporation

GROWER GROUP ALLIANCE

Australian Government
Future Drought Fund

CSIRO

Melbourne Water

Wetland Revival Trust

WESTERNPORT WATER™

Murray Darling WETLANDS WORKING GROUP LTD.

Arthur Rylah Institute for environmental research