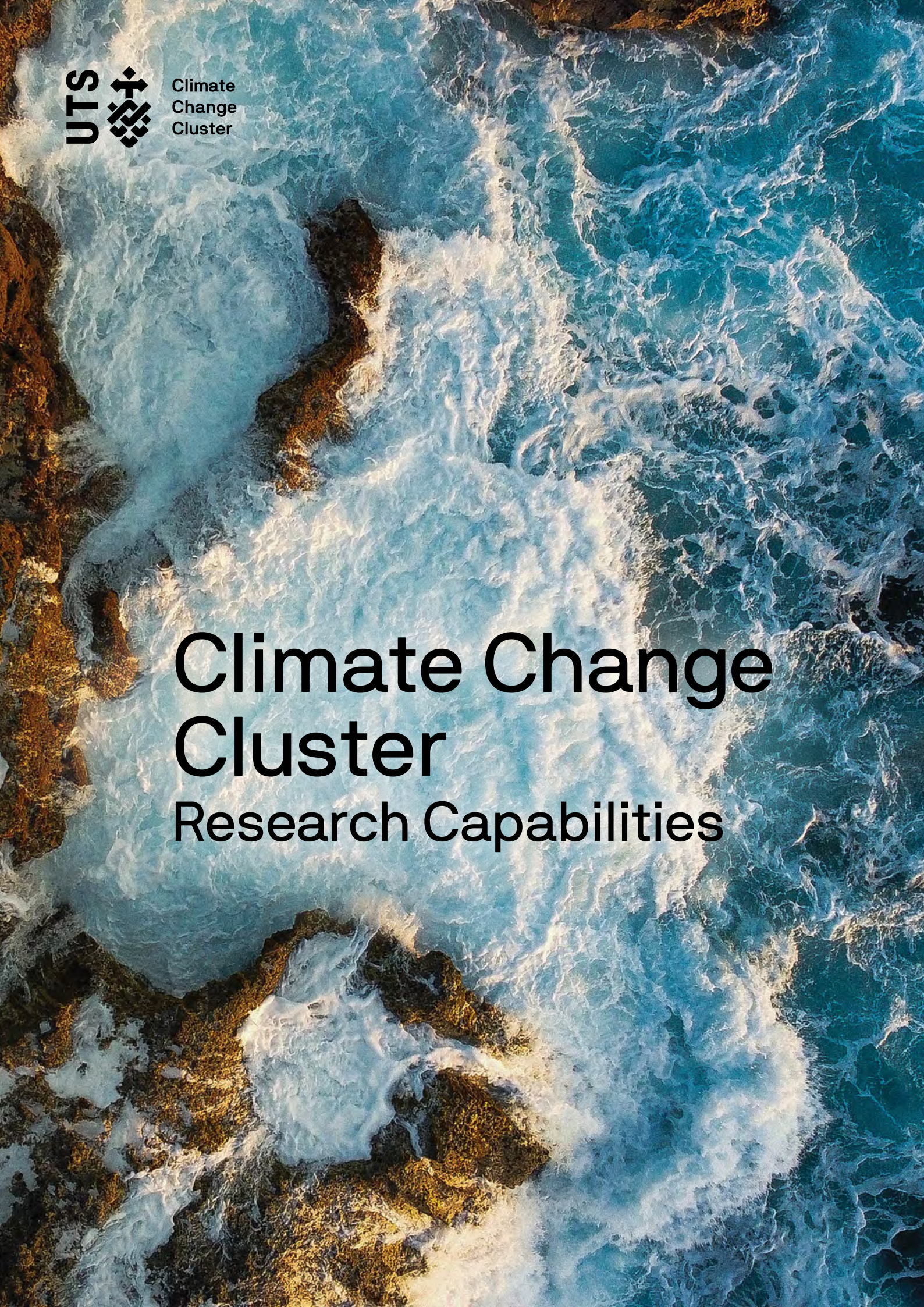


UTS Climate Change Cluster

Climate Change Cluster

Research Capabilities

Contents

Overview

This document highlights the Climate Change Cluster's (C3) vision and mission of transforming society through high-impact interdisciplinary research and scientific discovery. Presented within this document are C3's areas of expertise, capabilities, and tools utilised to address major environmental concerns and societal challenges. Key research case studies within C3's portfolio are presented, highlighting the institute's diverse partnerships and research impacts.

The focus of C3 in the coming years is to maintain the institute's research excellence and innovative outputs, foster the growth of the next generation of experts, and expand engagement with external stakeholders to create real-world impact.

Acknowledgment of Country

The Climate Change Cluster acknowledges the Gadigal People of the Eora Nation, the Boorooberongal people of the Dharug Nation, the Bidiagal people and the Gamaygal people upon whose ancestral land the University works across. We would also like to extend our acknowledgements to the land and sea countries where our team conducts research work. We recognise these peoples continuing connection to land, sea and community and pay our respects to the Elders - past, present, and emerging – as the traditional custodians of knowledge, language, and culture.

About the Climate Change Cluster (C3)

The Climate Change Cluster is a multidisciplinary research institute of over 100 research and support staff. Our research encompasses oceanography, productive coastlines, climate change, environmental microbiology and algal biotechnology.

C3 represents the highest concentration of interdisciplinary aquatic specialists in the Asia Pacific region, and our team has a proven track record of high performance, industry engagement, and funding success. C3 provides a deeper understanding of the world's aquatic ecosystems that are critical to the well-being of the global community. We produce new insights that address the challenges of human and ecological interactions with the climate.

Our vision

To be globally recognised for transforming society through scientific discovery, and provide meaningful strategies for climate adaptation by deepening our understanding of the impacts of climate change on ecosystems, and climate mitigation via innovations to Australia's bioeconomy.

Our work aligns with the below United Nations Sustainable Development Goals:

Our mission

To drive high-impact interdisciplinary research that creates a deeper understanding of the influence of climate change on ecosystems and society, and thereby develop meaningful strategies to combat major global issues including food and energy security, sustainability, ecological resilience and global health.

Quality

Continue to produce high quality research, utilising world class facilities.

Collaboration

Collaboration across teams and expertise to drive innovation.

Impact

Real world impact as research is motivated by solving global issues.

C3's Executive Director

Professor Peter Ralph

Australia's climate is changing; so is public awareness, media, government policy, and stewardship for businesses to consider and reduce their impact on the environment. C3 is a pioneer in supporting Australia's transition towards addressing climate change, establishing ourselves as progressive thinkers in the field.

C3 has had the privilege of partnering with organisations and companies that share strategic visions surrounding the ocean and its capabilities to support our planet. Working collaboratively has allowed us to test the frontiers of possibilities and ensure our partners can be impactful across their sectors. Change comes with innovation and research, and we want to keep pushing these boundaries to ask what is possible and delve deeper into the unknown. Our partners want to be part of this journey and see the benefits of collaborative research as a tool for driving change.

Moving between practical and theoretical applications of science has been a benchmark of C3's aims and now we are pivoting towards a significant shift in alignment with the UN's Sustainable Development Goals (SDG's). I'm not shy about spotlighting the impact C3 is having and am proud of our contributions. Our reputation has grown over the past 14 years as national leaders in protecting marine ecosystems and driving an economy fuelled by biological resources that support, not take from our planet.

Global Challenges

The world is facing unprecedented change due to the climate crisis and rapid urban growth. Climate variations are leading to intense alterations of marine and aquatic systems, resulting in a profound impact on ecology, society, and our economy.

Hence, the impacts of the climate crisis have become an existential threat to societies worldwide. It is well established that we need to take immediate climate action to limit the effects of the current climate crisis, and this has placed C3 in a central position.

C3's research focuses on addressing the biggest climate-induced environmental and societal issues facing Australia and other countries, such as sustainability, food and energy security, ecological resilience, global water quality, and community health.

Through scientific research, we can develop a deeper understanding of these impacts and design effective mitigation and adaptation strategies. At C3, we focus on the development of adaptation strategies focusing on conservation, management, and climate resilience, and mitigation strategies such as innovation of technical solutions to remove CO_2 from the atmosphere.

Healthy coastal habitats

Up to 90% of the biomass in the ocean is made up of micro-organisms, which play critical ecological roles within all marine ecosystems. They perform the majority of photosynthesis in the ocean, supporting the base of the marine food web and mediating ocean productivity. **They can even impact marine animals, plants, and human health.** Understanding how marine microbial communities are impacted by global climate change is fundamental for creating accurate predictions of how our oceans will function in an increasingly changing world.

Large parts of Australia's coastline are highly urbanised, resulting in anthropogenic pressures that are having detrimental impacts on these environments. Among these, impaired water quality causes adverse implications for marine micro-organisms, ecosystem function, and human coastal activities. **We have identified that these issues require innovative solutions to transform the capacity of environmental monitoring and management**, for instance improving the ability to identify and track sources of contamination. We are pioneering the way we understand our oceans and the ecology within, by examining microbes across a range of marine environments (from tropical coral reefs to Antarctica). We are dedicated to researching how future oceans will adapt and function, and what is required to maintain ecosystem health and safeguard marine animals and plants and human health.

Community health and wellbeing

With continued increases in surface temperatures, ocean acidification, and more extreme weather, organisms inhabiting the ocean are living in an increasingly unpredictable world. These significant variations in weather can have a severe impact on marine organisms, water quality, and sediment quality. Recently, increased rain events and disposal of wastewater into coastal waters are introducing a range of contaminants of emerging concern (CEC; e.g. antimicrobials, pharmaceuticals, and microplastics) that negatively impact water quality and can be detrimental to human health. It is estimated in Sydney Australia alone, that poor water quality contributes to 180,000 illnesses a year.

To safeguard our communities, **we are determining the concentrations of CECs that negatively impact Australia's water quality.** Our research is conducted in partnership with the government (international, national, state, and local), industry (including water authorities), and Indigenous communities. **We are currently collaborating with 43 water authorities and state, Northern Territory, and local governments** to build an evidence-based understanding of the environmental concentrations of these contaminants and their ecological significance in Australian coastal waters. Our work allows us to inform policy, investment, and regulation to deliver sustainable solutions to combat climate change and improve coastal development, and in return safeguard our marine ecosystems and human health.

Ecological resilience

Coral reefs are one of the most biodiverse and beautiful ecosystems on the planet, supporting a quarter of all marine life including more than 4,000 species of fish. But corals' magnificent services extend beyond the shoreline, with 1 billion people, including many of the most vulnerable people in society, deriving some benefit from coral reefs. In April 2024, the US National Oceanic and Atmospheric Administration declared that the world is experiencing its 4th Mass Coral Bleaching Event, with the devastating effects of record ocean heat being felt across the Great Barrier Reef. **This marks the 5th coral bleaching event reported for the Great Barrier Reef in the last 8 years.** It is a devastating reality that even with immediate climate action, more reefs are likely to be lost.

We focus on the innovation of unique solutions, such as **the development of collaborative restoration and conservation approaches at the most valuable (ecological and economic) locations.** The main goal of our research is improving reef resilience and health, but not necessarily to any given pre-defined ecological state. We are pioneering novel techniques such as tailored nutritional supplements that may improve coral resilience to change and stress (i.e. heat), and hence support adaptation to the "reefs of tomorrow".

Coral reefs represent a significant source of food, trade, and cultural identity for coastal peoples. Hence, we actively collaborate with local Indigenous communities to develop community-based restoration management plans that align with their needs and interests. **Our researchers are currently crafting an inaugural Groote Eylandt's Sea Country Management Plan in collaboration with the Anindilyakwa Land and Sea Rangers in the Northern Territory**. Our team shows what can be achieved using novel technologies and when communities work collectively to benefit the reef and the many stakeholders that rely on reef resources. Our findings and knowledge have the potential to be transcribed across the globe and be tailored to various reef types to improve existing global restoration efforts.

Climate mitigation

Currently, our society depends on an economically attractive fossil-based economy which is unidirectional, exploiting non-renewable resources. This linear model fails to exploit abundant renewables, resulting in a significant sustainability crisis. It is predicted the human population will exceed 9 million people by 2037–2046, further exacerbating current major climate issues such as pollution, food, and energy security. Hence, there is a vital need to improve circularity within industries to enhance sustainability and longevity of production. A major priority is the development of strategies that result in the decarbonisation of industry outputs. Carbon dioxide is one of the most significant greenhouse gases produced, driving global temperatures close to an increase of 1.5°C.

In response, we are developing technologies, products, and services that enable the industrialisation of photosynthetic algae. **Algae holds great promise for tackling the global need for sustainability due to its ability to fix atmospheric or industrial carbon** and result in biomass that can be utilised for alternative manufacturing feedstock including cosmetics, plastics, nutraceuticals, agricultural feed, and pharmaceuticals. Algae can be grown in various water sources (fresh, saline, brine, and waste), and can act as environmental bio-remediators, resulting in the treatment of wastewater.

C3 represents one of the world's largest groups of integrated algae specialists, with a team of collective expertise in microfluidics, bio-optics, algal physiology, robotics, natural-product chemistry, polymer chemistry, phenomics, mutagenesis, and genetic and metabolic engineering. **We aim to harness the power of algae together with robotics and artificial intelligence to decarbonise key manufacturing and utility sectors** of the economy and hasten the global move away from fossil fuels as an energy and raw materials source.

C3 works with a diverse range of stakeholders including government, industry, community, and Indigenous peoples to develop co-designed actionable solutions to:

- Accelerate the use of algae and algal-based bioproducts for industrial decarbonisation.
- Develop viable community-focused restoration programs that improve reef resilience and economic outcomes.
- Develop precise water quality monitoring tools to enable near real-time generation of water quality alerts to safeguard coastal communities.
- Inform state and federal governments of emerging water contaminants of concern.
- Foster collaboration and inclusivity to ensure ecological and restoration management projects align with Indigenous communities' interests and needs.

C3'S Research Teams and Leaders

Ocean Microbes and Healthy Oceans

Professor Justin Seymour

The team

A diverse team of oceanographers, microbial ecologists, and marine ecologists.

Research strength

Designing and developing innovative microbial tools and methodologies to study the influence of shifting environmental conditions on aquatic micro-organisms.

Mission

Offering tools and knowledge to sustain and maximise marine ecosystems, while conserving biodiversity and reducing environmental impacts.

Productive Coasts

Professor Martina Doblin

The team

A dedicated team of researchers striving to better ocean health for future generations.

Research strength

Developing and utilising leading-edge technologies to determine cellular and population level responses, and examine processes that impact water and sediment quality.

Impact

Informing policy, investment, and regulation to deliver sustainable solutions to the global challenges of climate change and coastal development.

Algal Biosystems and Biotechnology

Co Leaders: Professor Peter Ralph, Associate Professor Mathieu Pernice

The team

A multi-disciplinary group of scientists and engineers accelerating the use of algae and algal-based bioproducts to decarbonise industry biomaterials.

Research strength

Incorporation of algae and their derivatives in innovative green and clean technologies.

Mission

Delivering sustainable climate change mitigation solutions in various areas by replacing fossil-based raw materials with solar-based and sustainable algal products.

Future Reefs

Dr. Emma Camp

The team

A diverse group of passionate biogeochemists, coral biologists, and marine ecologists.

Research strength

Fostering innovative, robust, and effective collaborations to build restoration programs that facilitate collective community action.

Impact

Research that directly informs how reefs will look and function in the future, and how to better preserve and re-build “healthy reefs” of tomorrow.

Capabilities and expertise

C3 continually strives to use our expertise to meet the needs and demands of communities, governments, and industry. We develop mutually beneficial associations to deliver real results with quantifiable impact.

We can work with you on short-term projects to solve specific problems, or on a long-term basis to develop programs that meet a broader objective. By combining expert knowledge and experienced know-how, core infrastructure, rigorous process optimisation, and relentless monitoring of yield versus cost, we have the capabilities to address the following key priorities:

Australian Gov Priority	UN Sustainable Development Goals	C3 Research Team	Example
Food	3 GOOD HEALTH AND WELL-BEING; 13 CLIMATE ACTION	Algae Biosystems and Biotechnology, Ocean Microbes	Development of future proteins, nutraceuticals and colouring product applications for human food and animal feed sectors.
Soil and water	13 CLIMATE ACTION	Future Reefs, Ocean Microbes, and Productive Coasts	Coral restoration and resilience. Water quality assessment and management.
Resources	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Algae Biosystems and Biotechnology	Mineral recovery via algae treatment, development of algae-based foams and fibre.
Advanced manufacturing	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	Algae Biosystems and Biotechnology	Use of machine learning/AI (Algae Phenomics Facility).
Environmental change	13 CLIMATE ACTION	Future Reefs, Ocean Microbes, Productive Coasts, and Algae Biosystems and Biotechnology	Coastal environmental monitoring and management, and industrial decarbonisation.

Tools

Industrial systems

- Robotic PSI/Omron system: for increased screening capabilities of algae strains.
- Advance photobioreactors, raceways, and incubators with environmental control and sensors.
- Algenie: a carbon capture system that converts carbon dioxide into algal biomass for alternative industry applications.

Oceanography and ecology

- Designing and developing high throughput transportable phenotyping plate and protocols.
- Near real-time deployable water quality assessment tools.
- Microfluidic platforms and high-end microscopy for studying microbial behaviour.
- Offsite microbial analysis using our Micro CSI transportable lab.

Environmental management

- Coralclip, a stainless-steel spring clip that clamps a coral or fragments to the reef, enhancing coral plantation efforts.
- Microbial source-tracking equipment, to locate and detect sources of water contamination.
- In house nano-tanks for the propagation of an array of hard and soft coral species for custom environmental experimentation.
- Water Quality Forensic Suite for highly specific identification of sources of water contamination.

Specialised facilities and infrastructure

Phenomics facilities

The phenomics facility is an Australian and world-first lab designed for high throughput screening of algal strains, mutants, and transformants in a dynamic environment. The facility can rapidly screen, test, evolve, and characterise algae to optimise their potential for developing new products, accelerate production, and innovate sustainable biology. By identifying “elite” algae strains with preferable traits, the selection made through our unique machine-learning capabilities allows for these algae strains to be rapidly grown and utilised for research and commercial purposes.

Advanced algal growth and cultivation facilities

Includes an Industry 4.0 demonstration facility with robot-controlled sensor and digital twin for advanced algal manufacturing, as well as a wide range of facilities such as raceways, photobioreactors, incubators, light/temperature-controlled rooms for algal cultivation and upscaling, and PC2/AQIS accredited work areas.

Ecogenomics and molecular microbial ecology

Substantial capacity in metagenomics allowing the analysis of environmental micro-organisms, providing insights into the diversity, functions, and interactions of microbial communities. We have the expertise and facility to conduct amplicon sequencing, quantitative PCR, flow cytometry and advance microscopic techniques to reveal how microbial communities’ function, adapt, and interact with each other and their environment.

Microbiome analysis facilities and microbial source-tracking facilities

Capacity to define the structure and function of the microbiome associated with a wide range of organisms and environments. Additionally, access and application of quantitative tools to elucidate the causes and sources of contamination within aquatic environments.

Bioinformatic pipelines

We have developed in-house pipelines for analysing ecogenomic and molecular microbiological data. This enables us to decipher, predict, and manage aquatic processes and habitats, and better understand the ecological foundation of aquatic habitats.

Oceanography and coastal ecology

Extensive equipment and infrastructure for monitoring environmental and microbiological processes within natural aquatic ecosystems. This equipment allows for improved management of inputs to coastal waters (i.e. agricultural and urban runoff) to maintain water quality for recreational and commercial activities.

Environmental biogeochemistry facilities

Includes continuous equipment enabling monitoring of temperature, salinity, O_2, pH (SeapHOx detection), light quality and quantity (spectrophotometers, PAR sensors), particular carbon and nitrogen, gas flux analysis (membrane inlet mass spectrometry), and full carbon chemistry, and respirometry chambers (organism O_2 and pH fluxes respiration, and calcification). This enables us to conduct experiments to examine the response of coral communities to environmental change and forecast ecological trajectories of reefs to aid risk analysis.

Photobiology and optics facilities

Includes state-of-the-art active fluorometry suites (LIFT and FastOcean Fast Repetition Rate fluorometers), diving PAM, and Joliot-type spectroscopy used for phenotyping and detailed assessments of photo-physiology and productivity. This facility offers targeted non-destructive monitoring of coral productivity and health, as well as a targeted assessment of different coral "phenotypes" for reef restoration and rehabilitation.

In-house coral husbandry aquarium facility

Situated at UTS and includes holding and quarantine tanks for propagating an array of hard and soft coral species, as well as an array of nano-tanks for custom environmental experimentation.

Multi-taxa coral nursery and out-planting site(s)

This facility is situated at the Great Barrier Reef and supports propagation, out-plant design, cost-benefit analysis, surveying techniques, and coral identification. This enables the implementation of developed coral reef management and restoration tools.

Working in Partnership

Achieving our mission of sustainable change requires genuine connections across all levels of industry, government, and civil society. We work hard to build and foster innovative, robust, and effective collaborations focused on mutual learning that inform and add value to our research. We are a point of contact for researchers looking to connect with complementary capabilities or for external stakeholders looking to engage with our researchers.

Case studies

Coral Nurture Program

The Coral Nurture Program is a new approach for the Great Barrier Reef that is initiated by a partnership between tourism and science.

Our unique approach is not about “reef restoration” per se, instead focusing on long-term stewardship and adaptation at economically valuable Great Barrier Reef locations; increasing available management tools beyond existing options to include planting corals. This doesn’t just involve out-planting corals to boost live coral cover at reefs that have experienced a fall in cover, but also helps ensure reef sites with existing high coral cover that are economically valuable to stay healthy.

This program was funded through the Australian and Queensland Government “Boosting Coral Abundance Challenge” and subsequently via the partnership between the Australian Government’s Reef Trust, the Great Barrier Reef Foundation and ROLEX Perpetual Planets.

Piping Hot

Piping Hot is an iconic Australian surf brand with a mission to protect our oceans.

Plastics and fibres continue to pollute and degrade our oceans. Piping Hot has commissioned C3 to develop an innovative biomaterial derived from seaweed. C3 scientists have developed a prototype fibre developed in response to Piping Hot’s ambition to protect oceans for future generations. The bio-based solution will sequester carbon from the ocean and reduce the environmental impact of synthetic fibres. This Australian innovation could transform the global polyester industry. As part of Piping Hot’s mission to defend the oceans, the purpose-led investment into marine biotechnology and material science is of vital importance.

“Together with UTS we intend to influence and impact change through marine science and transform the industry’s reliance on fossil fuels,” said Stan Wan, CEO and Managing Director of Piping Hot Australia.

Coral Nutrition

Super Supplement: Boosting coral resilience through nutritional subsidies.

In 2022-2023 the Future Reefs team's pioneering work on the coral elementome (i.e., the amount and stoichiometry of elements required by an organism) revealed novel biomarkers of stress tolerance. This work increased our understanding of the effect of the quality of nutrients, as opposed to the quantity available to corals. The findings revealed coral fitness can be improved by tailoring nutritional supplements at different life-history stages, such as providing lipids during the larval phase and antioxidants during the adult phase. These findings have been critical in the development of the next phase of this project focusing on identifying a network of trace elements, antioxidants, and lipids that boost coral fitness during thermal stress, and optimisation of nutrient delivery to corals.

Thanks to the revolutionary work conducted in 2023 on coral nutrition, the Future Reefs team has partnered with a team of transdisciplinary and international experts combining 70+ years of knowledge on coral nutrition to customise a nutritional super supplement. The project, funded by CORDAP, aims to develop "CoraBoost" to administer to corals and boost their resilience to thermal stress. CoraBoost is comparable to supplements humans take to sustain or boost their health. This project will combine laboratory studies and trials across different reefs to optimise the supplement.

Management of recreational water quality

A new research collaboration has used sophisticated DNA marker approaches to determine the primary cause of poor water quality at beaches. And guess what? It's us. This research collaboration involves the Ocean Microbiology Group, along with the NSW Department of Planning, Industry and Environment (DPIE), Beachwatch, and Central Coast Council, and has identified sewage as the primary cause of poor water quality.

Ocean Microbiology Group leader Professor Justin Seymour, his PhD student Nathan Williams and post-doctoral research associate Dr. Nahshon Siboni used sophisticated DNA marker approaches to analyse samples of storm water and seawater for human, bird, and dog faces. The team found that even in dry weather, several storm water drains at Rose Bay were contaminated by human faecal matter, or sewage.

Young Henrys

Thanks to the successful installation of two 400-litre bioreactors at Young Henrys Brewery in Newtown, we are continuing to absorb carbon dioxide produced from the fermentation process of brewing beer, resulting in the production of nutrient-rich microalgae.

We have now extended the partnership to include Meat and Livestock Australia, investigating the incorporation of microalgae grown into livestock feed to reduce methane produced by cattle and sheep during the fermentation of feed.

Young Henrys already sends brewers spent grain, a by-product of beer brewing, to farmers as livestock feed. Adding algae to this grain could reduce the methane produced by livestock and help improve productivity: a win-win for all.

Ecological impacts of wastewater discharge in marine environments

Professor Martina Doblin from C3 leads a project within the National Environmental Science Program's (NESP) Marine and Coastal Hub, focused on identifying the ecological impacts of wastewater discharges in marine environments.

The NESP Marine and Coastal Hub is one of four hubs funded by the National Environmental Science Program and contributes research that provides information to support decision making about Australia's coastal and marine ecosystems. This project, conducted in collaboration with the NSW Department of Planning and Environment, the University of Tasmania, University of Adelaide, The University of New South Wales, the Sydney Institute of Marine Science, and the Clean Ocean Foundation, aims to determine the concentration of emerging pollutants in different wastewater outfall settings, and assess where environmental impacts are greatest. Australia's Waste Policy Action Plan, Threat Abatement Plan for the impacts of marine debris and Australia's One Health Master Action Plan all refer to the need for emerging pollutants to be incorporated into contaminant guidelines.

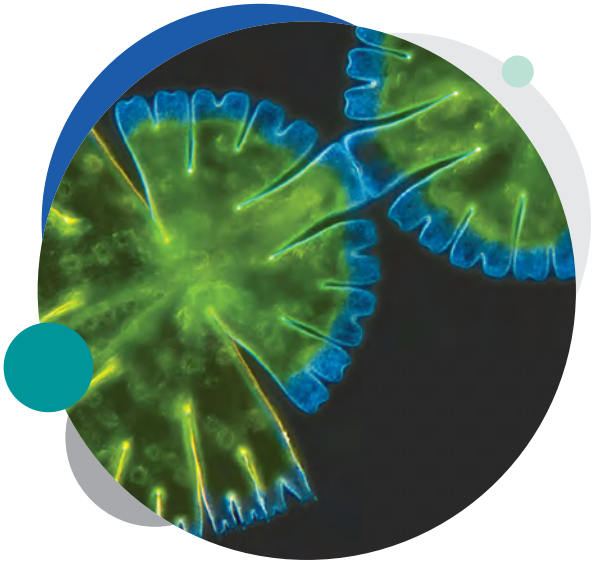
v2food

v2food is a plant-based protein company with a mission to create a food system 2.0.

Knowing that if we continue to consume meat at our current rates we'll need another whole earth full of resources to sustain us, v2food's focus is on creating sustainable food options to reduce our reliance on meat.

Working with C3, v2food are looking to continue their product development using microalgae at a commercial scale for use as a colouring ingredient in their products. This novel technology will allow for a unique and natural additive that replicates the natural colour of animal meat.

C3 and v2food's partnership is based on a research program. This ongoing partnership will bring together C3, CSIRO and v2food and lead to greater Australian algae industry development.



The Deep Green Biotech Hub

The Deep Green Biotech Hub (DGBH), established in 2016, connects businesses and community members in New South Wales with cutting-edge algae biotechnologies and innovation support.

Among its flagship programs is Green Light, inaugurated in 2018 as the world's first algae accelerator program. Green Light has fostered four successful cohorts, facilitating connections for 15 teams with research mentors and seed funding. Additionally, the program has trained 16 research mentors, fostering exposure to start-ups and an entrepreneurial mindset. Beyond Green Light, the Deep Green Biotech Hub has catalysed the creation or support of over 110 start-ups through various programming avenues, including mentorship and workshops. Moreover, its outreach efforts have engaged more than 260,000 individuals through events like Vivid Sydney, National Science Week, Splendour in the Grass, and UTS Start-ups programming.

The Deep Green Biotech Hub's endeavours are made possible by the Investment NSW Boosting Business Innovation Program and are bolstered by staffing and expertise provided by C3.

Our Future Focus

C3 is dedicated to advancing the bioeconomy by integrating innovative research and impactful solutions to enhance adaptation and mitigation strategies. Our future focus is centred around five key pillars to ensure we continue to drive meaningful change, support marine ecosystem health, and promote a resilient, sustainable future.

Research Excellence and Impact

We will continue to focus on research innovation and impact to help deliver a prosperous and sustainable future. We will leverage our size, expertise, and people to contribute to a better environment and society.

Enhanced Knowledge

We will share our knowledge through high-impact journals, plenary presentations, and by establishing our staff as thought leaders. We are committed to collaborating with industry and government stakeholders for impactful research.

Expand External Engagement

At C3 we will build the capacity for translating our research into impact through strategic partnering, commercialisation, enterprise creation, and entrepreneurship.

Grow the Next Generation

We will grow the next generation of research leaders. At C3 we prioritise building skills and expertise in leadership, performance management, learning and teaching so that our community (staff and students) flourishes now and in their future.

Sustainable Growth and Operational Success

We plan for C3's sustained growth by supporting research, training excellence, and our unique capabilities. Through effective management, enriching experiences, and strong partnerships, we ensure our community's continued success — for both present and future staff and students.

C3 FUTURE FOCUS

A resilient, sustainable future

Design: www.joyuendesign.com.au

UTS Climate Change Cluster

Further information

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