Ocean innovation

How New Technology Can Combat Oceanic Pollution and Climate Change

Dr. Carolyn V. Currie
Our Oceans Incorporated

Why the ocean matters

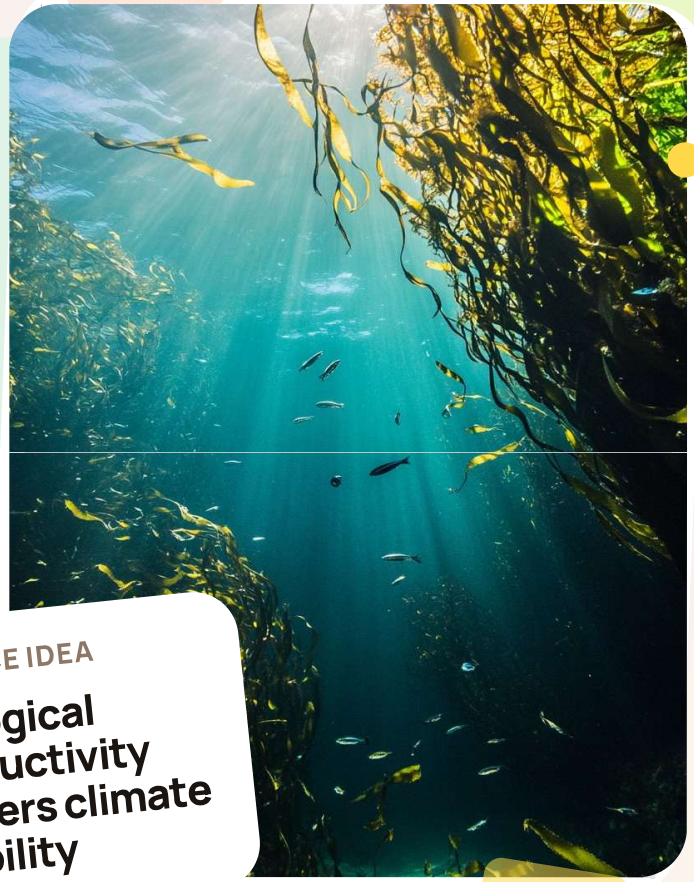
The ocean is Earth's carbon engine

30%

of annual carbon emissions captured

The ocean is the **largest carbon sink on Earth**.

living system, not extractive resource



SOURCE IDEA

Biological productivity powers climate stability

Oceanic carbon credits

Introducing Oceanic Carbon Credits (COCUs)

measured = valuable

COCU DEFINITION

One metric tonne of CO_2-equivalent removed and stored in the ocean through verified, additional, durable, and environmentally safe processes.

Structured to comply with **international climate, ocean, and carbon accounting frameworks**.

From invisible ocean uptake to a tradeable, auditable **carbon unit**

Australia focus

Australia's ocean carbon opportunity

Australia's ocean holds 3–4× more carbon stock than its land mass—yet the biggest share is still invisible in national accounting.

Only coastal blue carbon is counted today. Open-ocean sequestration inside Australia's EEZ remains scientifically significant, but economically and policy-wise ignored.

Source: Dr. Carolyn V. Currie / Our Oceans Incorporated

COUNTED VS. IGNORED EACH YEAR

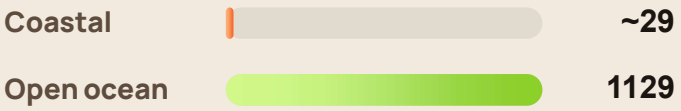
Coastal blue carbon currently counted

26–29

Open-ocean sequestration ignored in accounts

1,129

What the ledger sees



Huge asset. Tiny visibility.

Slide 5 · New framework

Project Ocean Dividend reframes the ocean as a managed carbon asset

Australia-first, globally scalable

Make Australia's ocean carbon visible, verifiable, and valuable.

Target LNLC zones in Australia's EEZ, strengthen the biological carbon pump, and turn measurable sequestration into governed climate value.

AI-optimized | MRV-led | UNCLOS · BBNJ · Paris

big marine scope

Australia's ocean holds 3–4× more carbon stock than its land mass.

Core mechanism

The Biological Carbon Pump

Ocean Dividend amplifies the ocean's own carbon-removal engine—moving carbon from surface blooms to long-term seabed storage.

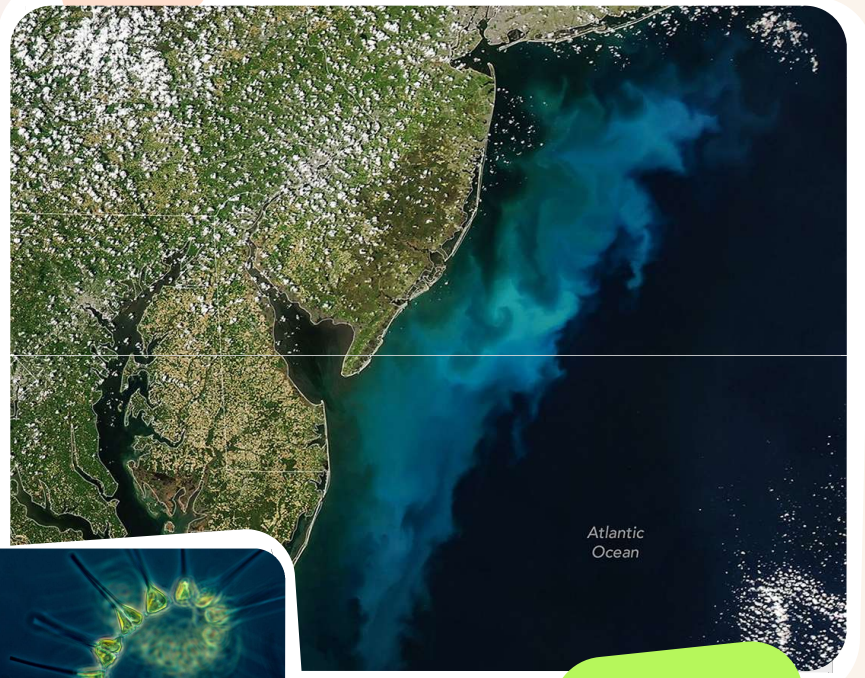
Phytoplankton fertilization
Targeted micronutrients in LNLC zones

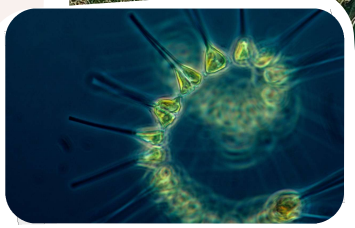
Primary production increases
Bloom productivity lifts measurably

Organic carbon export
Carbon moves down through the water column

Seabed storage
Verified flux to durable ocean storage

Why it matters: the project is designed to strengthen natural carbon export below the permanent thermocline and into monitored seabed burial pathways.





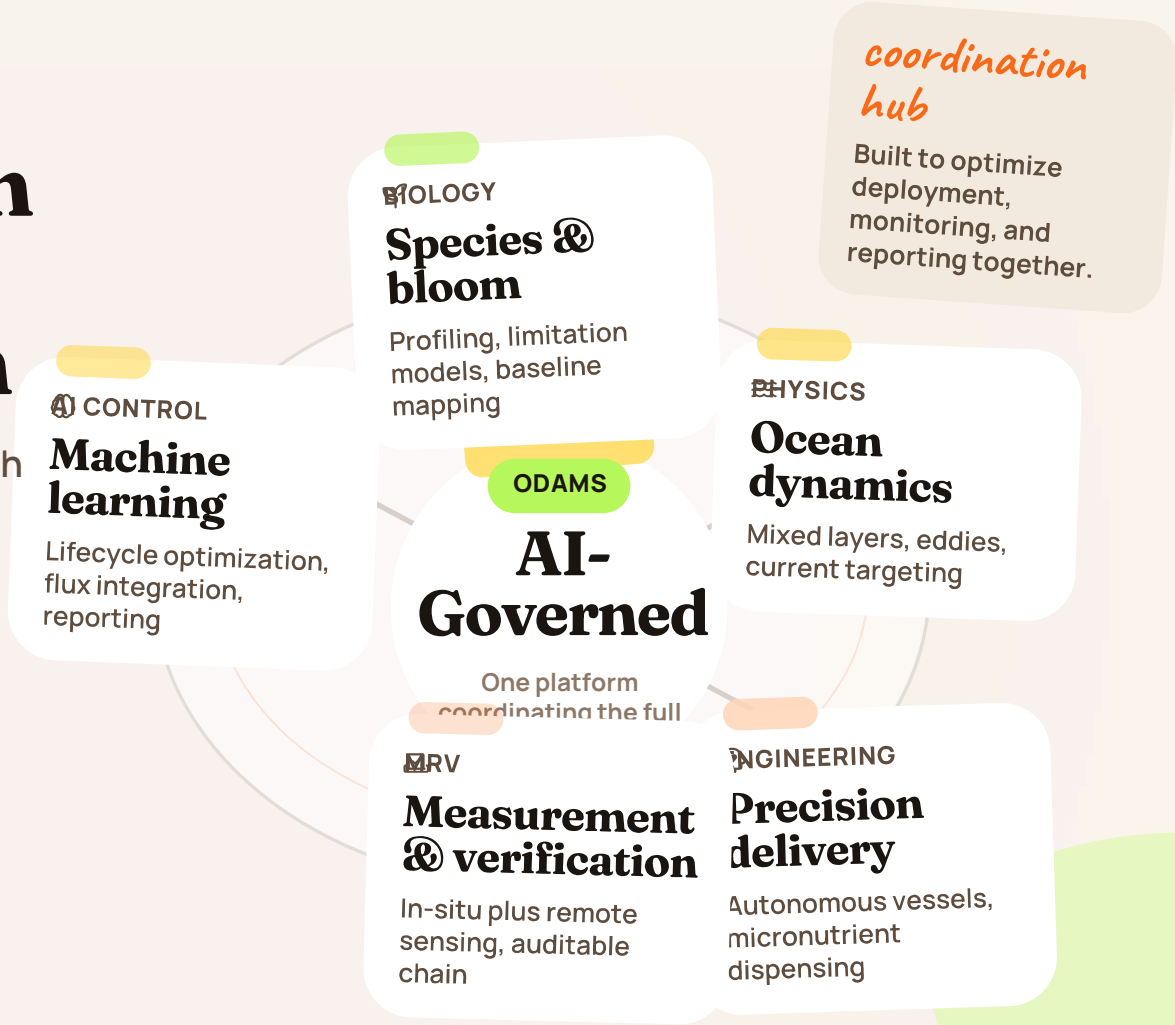
sink it deep

From tiny plankton to planetary-scale carbon drawdown.

AI-governed operations

ODAMS turns ocean intervention into a coordinated system

From site selection to verified carbon flux, each layer feeds one auditable operating loop.



Pilot proof

Ocean Dividend MVP: Proof of Concept

small pilot, big proof

- Productivity uplift is measurable
- Carbon export to seabed is verified
- Intervention is ecologically safe
- MRV chain is auditable
- Pathway to COCU issuance is demonstrated

AUSPICE-1

Coffs Harbour offshore pilot grounding MRV, regulation, and commercial proof in one real deployment.

Australia EEZ pilot site

Slide 9 · technology tradeoff

Ocean Alkalinity Enhancement: Promise and Peril

not simple

OAE may help the ocean take up more CO_2 — but the science warns that scale, ecology, and permanence remain deeply uncertain.

Why OAE is attractive

The core climate promise

Raises ocean pH

Less acidic seawater can improve conditions for carbon uptake.

Enhances CO_2 absorption

Higher alkalinity lets surface waters bind more atmospheric CO_2 as bicarbonate.

Could slow warming

If it works safely at scale, OAE could support climate mitigation and reduce acidification.

Why scientists are cautious

The major risks in the paper

Biodiversity impacts are unpredictable

Marine food webs and carbon exchange are complex; outcomes may be hard to control.

Temporary high pH can harm marine life

Italian research cited in the paper found pH spikes that may be dangerous.

Climate-scale deployment is material-heavy

Some pathways would require gigatonnes of mined alkaline minerals each year.

Source: Dr. Carolyn V. Currie · OAE review and comparison

Ocean alkalinity

Three approaches now being developed

3 paths

The paper groups OAE into three overlapping categories—each designed to help seawater absorb more CO_2.

1

Ground Minerals

Add alkaline rocks such as olivine or limestone directly to beaches or seawater, aiming to mimic natural weathering.

rock-based OAE

2

Electrochemical

Extract seawater, treat it, then return it in a more alkaline state—or remove dissolved CO_2 to boost future uptake.

seawater processing

3

Photochemical

Use light-triggered chemistry so a molecule becomes acidic in sunlight and neutral again in the dark.

light-activated chemistry

Current leaders

Electrochemical OAE players

snapshot

Pilot activity is global — but commercial ambition is already built around carbon credit sales.

Equatic

Los Angeles + Singapore

Electrolysis turns seawater into bicarbonate and solid carbonate, with hydrogen as a by-product.

Boeing pre-purchase

SeaO2

Netherlands

Bipolar membranes split seawater into acid and base, release CO_2, then capture and compress it.

Prototype → demo plant

Pronoe

France

Applies electrochemical treatment to coastal water and industrial effluents to create alkaline discharge.

Lab scale

Ebb Carbon

USA

Separates hydrochloric acid from seawater, raises alkalinity, and targets desalination and aquaculture sites. Raised over US$20M and already sold credits via Stripe.

Commercializing now

Captura

California + Canada + Norway

Softens seawater, splits acid/base, captures released CO_2, then neutralizes return flow. Pilots span California and Quebec, with Norway tied to CCS partners.

US$21.5M raised

Scientists warn

Why OAE concerns scientists

Slow uptake

CO_2-depleted water may take 100+ years to re-contact air and absorb more carbon.

Natural disruption

Tasmanian research found OAE can reduce natural alkalinity production.

Biological stress

Italian studies showed temporary high-pH spikes that can harm marine life.

Global warning

IMO warns of “deleterious, widespread, long-lasting” effects.

marine systems are fragile

Environmental uncertainty is the core issue.

Slide 13 · comparison

Ocean Dividend vs. OAE

why it wins

The paper argues Ocean Dividend outperforms current OAE on verification, safety, permanence, and legal readiness.

1 **Additional**
Carbon removal is verified beyond baseline productivity and natural flux.

2 **Measurable**
A full MRV chain tracks uplift, export, and auditable carbon outcomes.

3 **Durable**
Storage is verified below the permanent thermocline and against seabed burial rates.

4 **Environmentally Safe**
Interventions are reversible, risk-assessed, and BBNJ-compliant under EEZ governance.

5 **Compliant**
COCU issuance aligns with Paris Agreement Article 6, UNCLOS, and BBNJ obligations.

Operational pathway

From Intervention to Impact: the full pathway

measure it all

Ocean Dividend links deployment, continuous measurement, and auditable reporting into a carbon credit workflow.

ODAMS-GUIDED SEQUENCE

1. Site Selection
2. Nutrient Delivery
3. Real-Time Monitoring
4. Carbon Flux Measurement
5. MRV Reporting
6. COCU Issuance

The key claim is not intervention alone.

It is a full MRV chain: productivity uplift, export below the thermocline, verified seabed storage, and reporting credible enough for internationally compliant ocean carbon units.

real ocean, real proof

Operational reality: autonomous deployment, in-situ sensing, and continuous data capture feed the auditable MRV chain.

scale with care

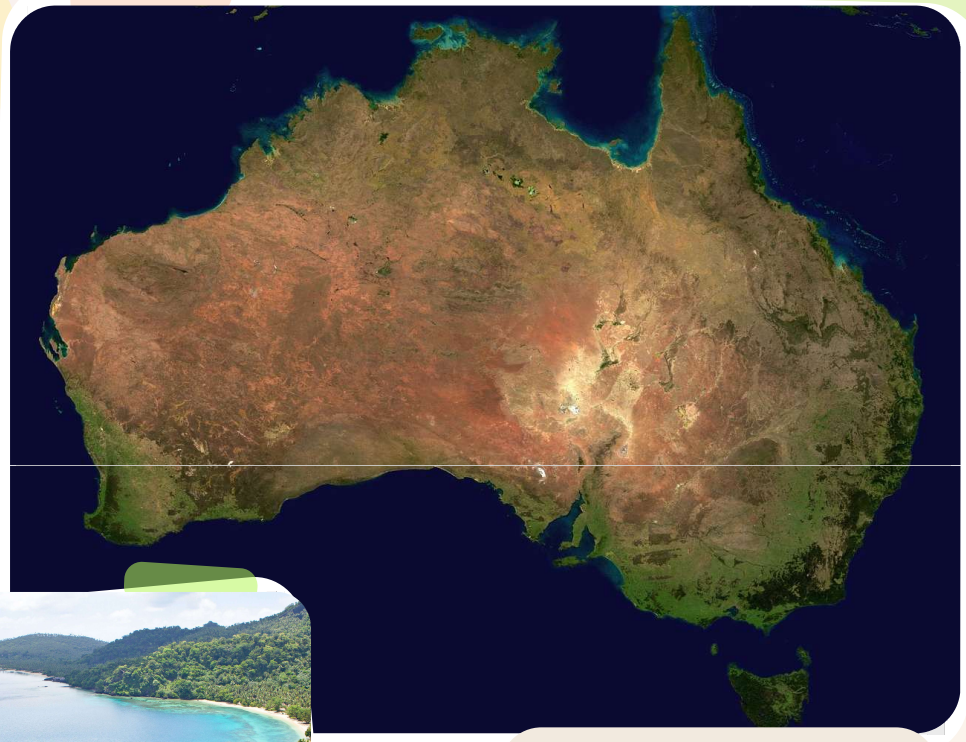
Scaling Global, Starting Local

AUSPICE-1 in Australia's EEZ proves the model locally—then expands through UNCLOS, BBNJ, and the Paris Agreement.

Coffs Harbour offshore

MVP first

global pathway



From one EEZ...

...to a repeatable coastal framework for other nations.

Roadmap

The Road Ahead: Three Critical Priorities

next, not later

The paper's message is clear: the science is moving—funding, standards, and policy must catch up

1

Fund Research Urgently

Accelerate rigorous trials of Ocean Dividend and OAE approaches before climate timelines close.

Prioritize ecological safety, reversibility, and proof that interventions can restore carbon uptake while monitoring pollution, temperature, and de-acidification in real conditions.

2

Establish MRV Standards

Build approved methodologies that make ocean carbon measurable, auditable, and creditable.

The document identifies MRV as the bottleneck: nations need a trusted chain from productivity uplift and carbon removal to verified long-term storage and internationally credible reporting.

3

Secure Policy Integration

Count verified ocean carbon credits toward national emission reduction targets.

Integrating COCUs and other compliant ocean credits into national accounting would align innovation with Article 6 pathways and turn ocean restoration into a real climate and economic instrument.

A new way to value the ocean

A Living Ocean as Economic Asset

The ocean is not a resource to be extracted. It is a living system to be activated—one whose productivity can feed the world, stabilize the climate, and generate sovereign economic returns.

FROM THE PAPER

Measure it.
Verify it.
Value it responsibly.

living asset, not extractive asset

Closing thought

New technology can return the ocean to its historic role as the world's biggest carbon sink and oxygen producer.

From AI-governed monitoring and verifiable carbon removal to safer ocean-centered innovation, the time to act is now.

Hope is measurable

Act now