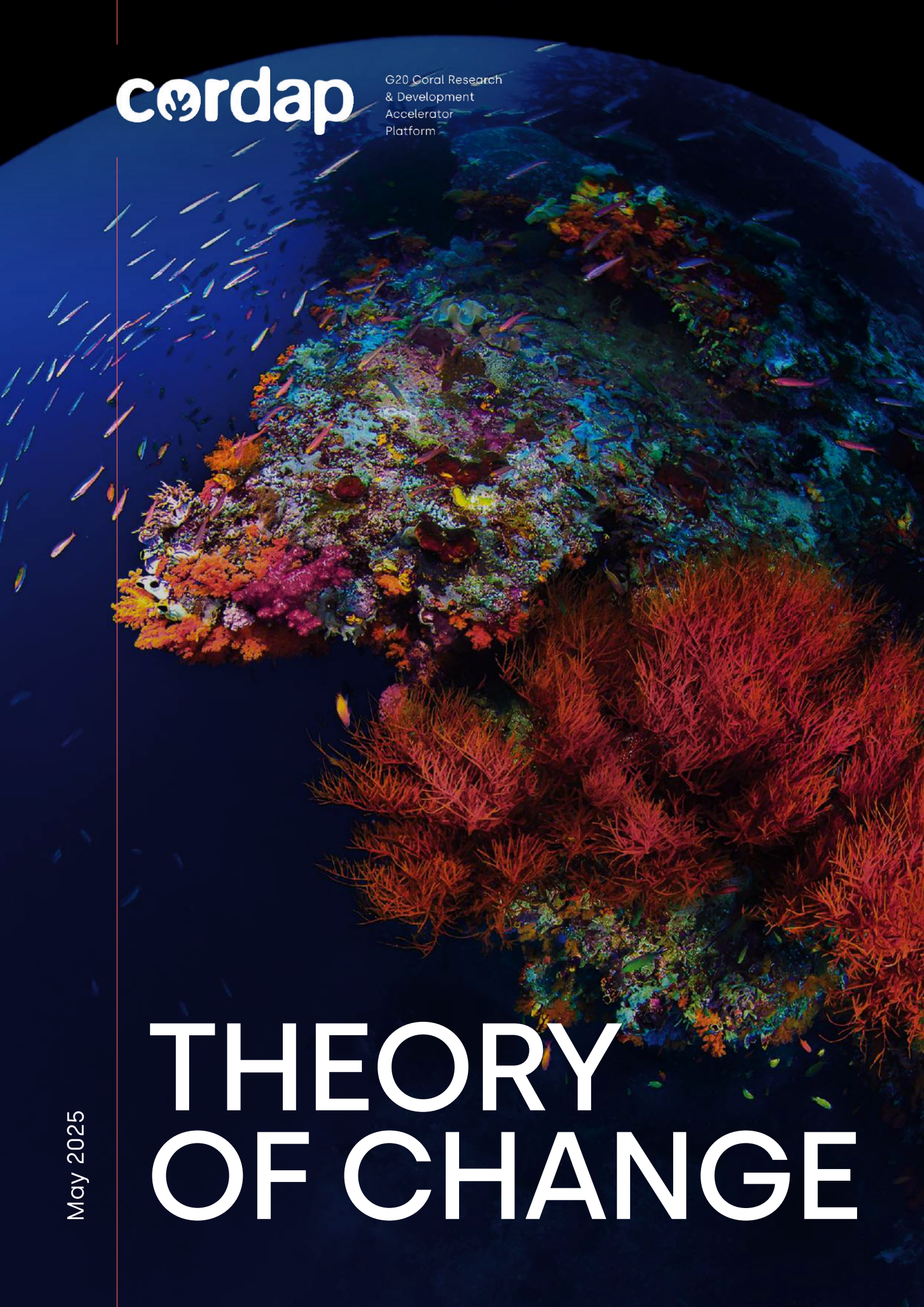
cordap

G20 Coral Research & Development Accelerator Platform



THEORY OF CHANGE

May 2025

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Credit: © Chizia Osele Bismarck / Ocean Image Bank

Foreword

Coral reefs are among the Earth's most magnificent ecosystems, supporting over a quarter of marine life, sustaining the livelihoods of a billion people, and serving as natural barriers that protect coastal regions. Their economic contribution amounts to an estimated US$2.7 trillion annually.

Yet, these invaluable marine treasures stand at the brink of **catastrophic collapse**. Since the 1950s, over two-thirds of tropical coral reefs have been lost. The latest scientific evidence suggests that the world has already surpassed **1.5°C of warming above pre-industrial levels**, with 2023 and 2024 witnessing **unprecedented coral mortality**. The global coral bleaching crisis of 2025 has reached an **extraordinary and devastating scale**, with approximately **84% of the world's coral reefs affected**, marking the most extensive event in recorded history. This catastrophe, ongoing since early 2023, has been driven by record-breaking ocean temperatures linked to climate change. A threshold once projected for the next decade but unfolding now. The urgency for action has never been greater, the survival of these ecosystems, and the balance of marine life, is at stake.

Today, the ocean sounds an **SOS**, a distress call from the very heart of our planet's life support system. Rising sea levels, extreme climate events, unsustainable exploitation and pollution are driving the world's coral reefs to the edge of **irreversible loss**.

The time to act is not tomorrow, it is now.

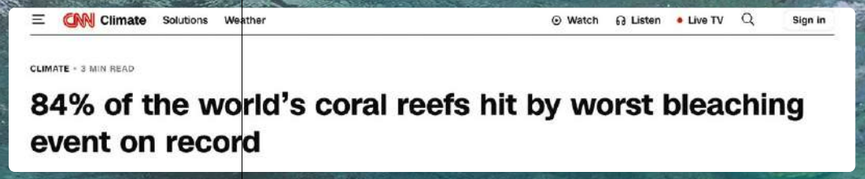


Credit: © Renata Romeo / Ocean Image Bank













The future of corals and reefs hang by a thread.

Credit: © The Ocean Agency / Ocean Image Bank

The Coral Crisis

These ecosystems, vital for marine biodiversity and society, are facing the threat of functional extinction due to climate change, pollution, sedimentation, mining, over-fishing and other human activities. As the planet reached 1.5°C degrees of warming above pre-industrial levels in July 2023, we have entered the range of planetary warming the Paris Agreement sought to limit. In crossing this threshold, coral reefs have experienced unprecedented and devastating losses in 2023 and 2024. The window to act is closing rapidly, and the next decade will be critical in determining the fate of our corals and reefs.

While current restoration and conservation approaches show promise, they remain in their early stages of ideation, development and testing. Efforts are limited in scale, costly, and struggle to deliver consistent, long-term success. Survival rates at restoration sites and their ability to withstand environmental stressors - especially marine heatwaves - are significantly below the levels required to establish climate-resilient, enduring corals and reefs that can continue to support the benefits communities receive from these ecosystems. We urgently need effective, scalable, affordable solutions and we need them quickly. The worst-case scenarios we anticipated for the future are unfolding today, and we are running out of time.

The Coral Crisis
The Critical Contribution of Corals and Reefs: Globally

Occurring in more than 100 countries and territories, warm coral reefs and cold water corals are vital to human well-being, providing **food security, livelihoods** and **economic opportunities**, and **coastal protection** for at least **500 million people** across the world.

>50%

[Medical research]
>50% of new cancer drug research focuses on marine organisms, with many being found on coral reefs

1bn

[Livelihoods]
1 bn people rely on coral reefs for food, income, and coastal protection

25%

[Biodiversity]
25% Marine fish species.
Bustling hubs for marine life

$2.7trn

[Value]
In ecosystem services

>$4bn

[Protection]
>US$4 bn in reduced storm damages and lower the # of people affected by flooding by 45%

$6.8bn

[Fisheries]
US$6.8 bn the amount corals generate in annual net profits from global fisheries

Credit: © Yen-Yi Lee / Ocean Image Bank

The Coral Research & Development Accelerator Platform (CORDAP) is the only international organization fully dedicated to funding global research and development for tropical and cold-water coral restoration and conservation. We believe research and development can shift the boundaries of what is possible, ensuring that our ambitions for the future of corals aren't limited by the technology available today.



Credit: © Cristina Mittermeier / Ocean Image Bank



Credit: © Fabrice Dudenhofer / Ocean Image Bank

The Vision

CORDAP's vision is thriving corals and reefs, fully protected in perpetuity, for the benefit of nature, communities and humanity.

The Mission

CORDAP will unite the world to accelerate global coral research and development to provide the technologies and innovations needed to safeguard the future of corals and reefs in a deteriorating ocean, to preserve the benefits they provide for the environment and humanity.

The Desired Impact

CORDAP's impact will be the creation of innovative, affordable, resilient and scalable solutions capable of stopping further decline of corals and reefs, and to restore 30% of degraded habitats following the world's pledged global biodiversity goals*.

*(*Based on the **Kunming-Montreal Global Biodiversity Framework**)*

Strategic Pillars

1

Enhance research and development solutions currently being explored for coral reef and deep-water coral protection, restoration and adaptation and drive innovation to develop new research and development solutions.

2

Foster capacity-building, collaboration, and knowledge-sharing among scientists and practitioners across the entire socioeconomic spectrum, with particular attention to those in middle and low-income nations.

3

Advance promising solutions from concept, to proof of concept, and empower entrepreneurs to progress solutions from pilot scale to full deployment.

4

Empower local stakeholders and coral communities to deploy tools and approaches to protect, restore and adapt corals and reefs to local conditions.

5

Drive a global collaborative program with public and private sector stakeholders to build partnerships that enhance research and development, conservation, restoration and policy reform.

6

Secure and allocate resources for CORDAP's work.

Commitments

- Work with a gender- balanced, transdisciplinary global community of scientists, technologists and innovators to achieve our goals.
- Make the benefits of the program accessible to all stakeholders worldwide, including NGOs, academia, private entities and governments.
- Promote the participation of grantees from middle- and low-income countries.
- Provide open-source publications and technologies for the benefit of all coral communities.
- Ensure a streamlined application and administration process to ensure that applying to and participating in the program are not burdensome.
- Have a robust and methodological review process to select projects and participants.
- Be guided by a diverse demographic of world-leading experts.
- Have no administrative costs (these are absorbed by King Abdullah University of Science and Technology as a contribution to CORDAP's work).

Credit: © Beth Watson / Ocean Image Bank

Impact Targets over 10 years

CORDAP's impact will be the creation of innovative, affordable and scalable solutions capable of stopping further decline of corals and reefs, and to restore 30% of degraded habitats following the world's pledged global biodiversity goals*.

CORDAP aims to:

$300m+
Public & private funding mobilised for R&D, and capacity building

≥2.5°C
Of additional heat tolerance achieved through innovative adaptation technologies

80%
Reduction in coral outplant cost (from $15 to $3) through innovation

100k+
Coral practitioners trained, with emphasis on inclusion of LMICs**

100+
Coral restoration ventures enabled

+VE
Positively impact regional, national and international policy decisions which safeguard corals

>$60Bn
Annual Reef-Based Economic Value Preserved Through Enabling Science, Technology and Innovation

150m+
Reef-Dependent Livelihoods Secured by Making Solutions Possible

** Based on the Kunming-Montreal Global Biodiversity Framework target*
*** LMIC's – Low-Middle Income Countries*

Theory of Change summary

Vision
Thriving corals and reefs, fully protected in petuity, for the benefit of nature, communities and humanity.

The Mission
CORDAP will unite the world to accelerate global coral research and development to provide the technologies and innovations needed to safeguard the future of corals and reefs in a deteriorating ocean, to preserve the benefits they provide for the environment and humanity.

Pillar 1	Pillar 2	Pillar 3	Pillar 4	Pillar 5	Pillar 6
Strengthen and innovate coral reef R&D for protection, restoration, and adaptation	Promote global collaboration, especially supporting scientists in low- and middle-income countries	Advance solutions from concept to deployment, supporting entrepreneurs	Enable local communities to apply tools tailored to their reef environments	Build global public-private partnerships to drive conservation and policy reform	Secure and allocate resources for CORDAP's work

Programs

Coral Accelerator Program	Coral Local Innovation	'Moonshot' Challenge Fund	Entrepreneurship Program	The Coral Academy	Awareness Creation
$1.5m per project for up to 3 years to drive coral innovation	Program $100k grant per coral project in low middle income countries	Funds R&D challenges for breakthrough coral reef solutions	Turning innovations into scalable coral restoration businesses	Train at least 1,500 practitioners to actively manage >7,500 km² of coral reefs	Mobilizing communities to champion coral conservation

- Research & Development
- Scaling
- Enable & Amplify

Commitments

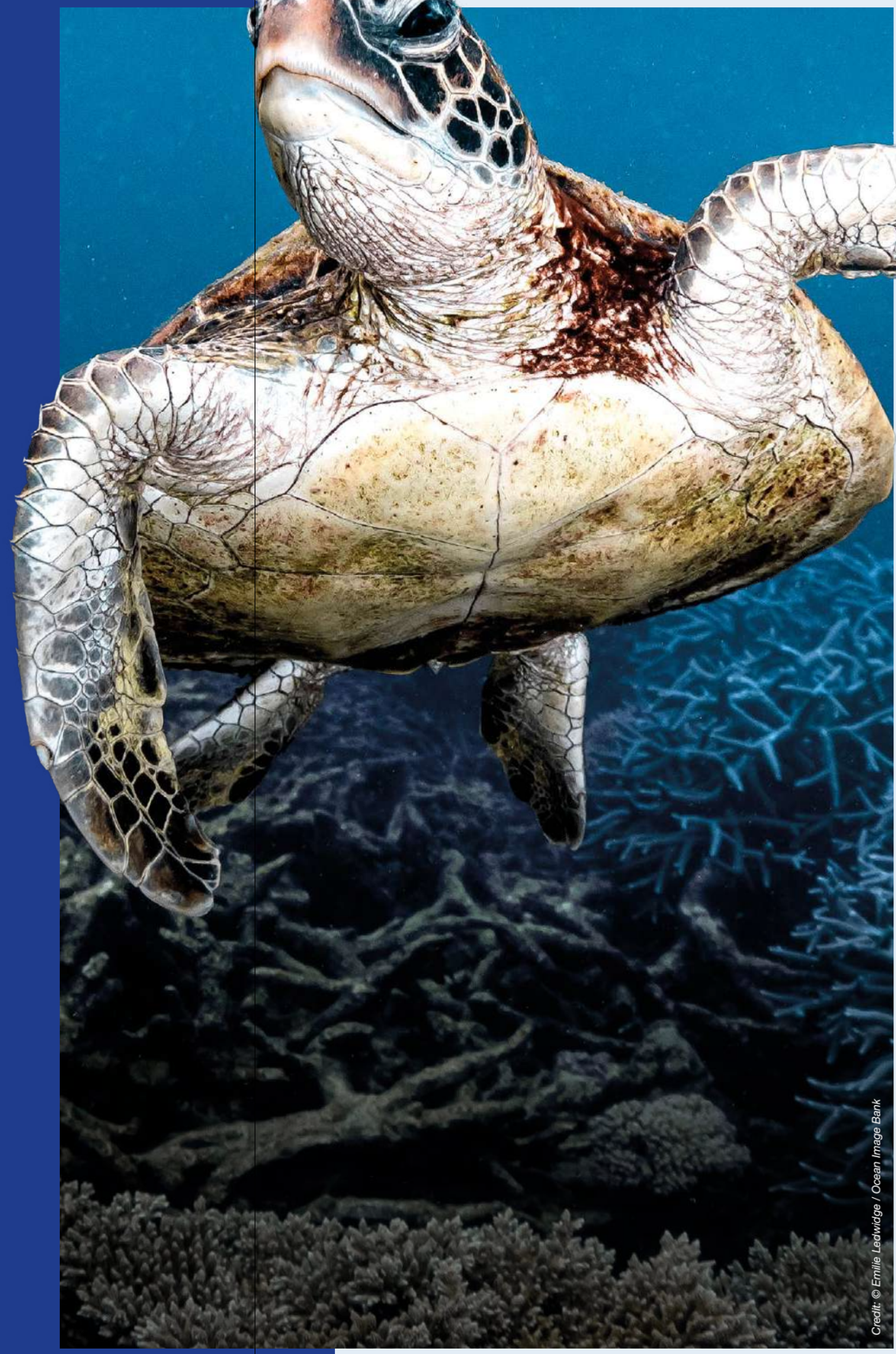
- Gender-balanced, transdisciplinary global community
- Open-source outputs for all coral communities
- Support for low- and middle-income countries
- Streamlined application and admin processes
- Guided by a diverse demographic of world-leading experts

Impact Targets over 10 years

- **$300M+** Public & private funding mobilised for R&D, and capacity building
- **≥2.5°C** of additional heat tolerance achieved through innovative adaptation technologies
- **80%** Reduction in coral outplant cost (from $15 to $3) through innovation
- **100K+** Coral practitioners trained, with emphasis on inclusion of LMICs
- **100+** Coral restoration ventures enabled
- **+VE** impact regional, national and international policy decisions which safeguard corals.
- **>$60Bn** Annual Reef-Based Economic Value Preserved Through Enabling Science, Technology and Innovation
- **150M+** Reef-Dependent Livelihoods Secured by Making Solutions Possible

CORDAP's impact will be the creation of **innovative, affordable, resilient** and **scalable** solutions capable of stopping further decline of corals and reefs, and **to restore 30% of degraded habitats** following the world's pledged global biodiversity goals*. *(*Based on the Kunming-Montreal Global Biodiversity Framework)*

The Coral Crisis
CORDAPs contributions towards achieving the Global Goals



- CORDAP helps to **conserve and sustainably use the oceans, seas and marine resources** for sustainable development by (i) Minimizing and addressing the impacts of ocean acidification, including through enhanced scientific cooperation at all levels. (ii) increasing scientific knowledge, developing research capacity and transfer marine technology, with a focus on LMICs.

- **Empowers LMICs and promotes gender balance** to actively lead coral research, restoration, and conservation, ensuring their vital role in protecting marine ecosystems
- **Boosts coastal livelihoods** by scaling coral reef protection projects, creating sustainable jobs, and reducing poverty in vulnerable communities
- **Builds capacity** by equipping conservationists, divers, guides, and fishers to restore reefs and unlocks economic opportunities

- Develops and deploys **affordable, resilient, and scalable** solutions to protect and restore corals and reefs, supporting **sustainable fisheries**, strengthening **marine food systems**, and securing food sources for coastal communities
- Promotes the use of coral reef restoration as a **natural barrier to protect coastal cities and communities** from erosion, storm surges, and rising sea levels, reducing disaster risks and supporting sustainable urban development

- **Bridges critical knowledge gaps** in coral conservation and develops technology roadmaps to mitigate the impacts of climate change and human activities
- **Enhances coral resilience and adaptation**, equipping species to withstand climate-related challenges such as ocean warming and acidification

- **Strengthens cross-sector collaboration** by uniting public and private stakeholders to mobilize resources, expertise, and strategic partnerships, driving collective action toward shared goals.
- **Fosters a global, transdisciplinary approach** to accelerate research, knowledge exchange, and innovation, ensuring the rapid development and scalable deployment of impactful solutions

THE BIODIVERSITY PLAN
For Life on Earth

Kunming-Montreal Global Biodiversity Framework calls for the restoration of **30% of degraded ecosystems by 2030.**

- Filling knowledge gaps and building capacity
- Advancing cost-effective technologies
- Providing free access to new technologies
- Partnering with local stakeholders to deploy best in class R&D tools

Strategic Pillar

1



Credit: © Shaun Wolfe / Ocean Image Bank

Enhance research and development solutions currently being explored for coral reef and deep-water coral protection, restoration and adaptation and drive innovation to develop new research and development solutions.

The Preservation and Conservation of Existing Corals

Innovative conservation strategies are needed to enhance in-situ conditions of corals, such as developing treatments to bolster coral resilience and effective measures to improve local water quality.

Develop Assisted Evolution for Corals

To avoid corals bleaching as climate impacts grow, we need interventions that can help coral species adapt to environmental changes more quickly than they would via natural selection. Assisted evolution for corals refers to a suite of scientific interventions aimed at accelerating the natural evolutionary processes of corals to enhance their resilience to environmental stressors.

Improve Aquaculture and Automation for the Production and Planting of Coral

Automated systems could significantly increase the number of corals produced and planted, helping to restore degraded reefs faster.

Research Cold-Water Corals

Foundational research is needed into the geographical distribution, conservation status, health, biology, and reproduction of cold-water corals. Further data is also required to understand their restoration requirements when they are damaged.



Credit: © The Ocean Agency / Ocean Image Bank

Improve Intervention Planning, Risk, and Monitoring for Coral Restoration

Data which can improve decisions and data collection for interventions, for example: site selection, risk assessments, unintended impact studies, mitigation studies, baseline data collection, performance metrics and optimised use of resources, will have a large impact on the scalability of interventions.

Limit Early Life Stage Mortality of Corals

New solutions are needed that promote coral survival at the early stages, from developing growth supplements to creating environments that mimic the natural substrata they grow upon.

Create and Integrate Hybrid Reefs

Hybrid reefs can enhance habitat complexity, increase marine life, dissipate wave energy, provide resilience to storms, host transplanted coral fragments and provide substrates for enhanced coral growth

Strategic Pillar 1
Deep Dive – Coral Conservation & Restoration



Assisted Evolution for Corals could include:

Selective Breeding – Identifying and crossbreeding corals with desirable traits, such as heat tolerance or disease resistance, to produce offspring with enhanced resilience

Microbiome Manipulation – Altering the community of microbes associated with corals to improve their stress tolerance and overall health.

Genetic Modification – Using genetic modification to directly enhance traits like thermal tolerance or acidification resistance in corals.

Exposure to Stress – Subjecting corals to controlled environmental stressors (for example higher temperatures) to “train” them for greater resilience through acclimatisation or epigenetic changes.

Assisted Symbiont Evolution – Manipulating the symbiotic algae (zooxanthellae) that live within corals by selecting or engineering strains better adapted to warmer, more acidic conditions.



Credit: © Gaby Barathieu / Ocean Image Bank

Strategic Pillar

2



Credit: © Tracey Jennings / Ocean Image Bank

Foster capacity-building, collaboration, and knowledge-sharing among scientists and practitioners across the entire socioeconomic spectrum, with particular attention to those in middle and low-income nations.

Establish a Coral Academy

CORDAP's Coral Academy will financially and academically support a gender-diverse, internationally inclusive, transdisciplinary, global community of scientists, technologists, community leaders and innovators. This will provide freely accessible educational resources focused on coral biology, reef health and the techniques required for coral conservation and reef restoration. Additionally, it will train a significant number of skilled individuals capable of actively implementing interventions to enhance reef resilience and foster local increases in coral abundance.

Ensure Opportunity and Engagement are Given to Low- and Middle-Income Nation Scientists

Most tropical shallow-water corals are found in middle- and low-income tropical nations, whose populations are disproportionately dependent on the benefits coral reefs provide for coastal protection, food security and tourism. Yet, scientists and technologies from these nations have had low participation opportunities to advance coral reef research and innovation. CORDAP is committed to elevating the capacity of scientists and technologists from these nations by providing them with opportunities to access funding and infrastructure, as well as to collaborate with global research groups.

Facilitate Information Access and Sharing

CORDAP aims to expand its network of field, research, and testing facilities across a diverse number of institutions. It will establish a coordinating mechanism to link existing national, regional, and international research and development programs, facilitating the exchange of knowledge and expertise. This will help identify potential synergies and priorities in the research and link these for global knowledge-sharing, which will enhance the development of diverse methodologies and innovative approaches to tackle coral decline.

Provide Advanced Research and Development Training

It is essential to swiftly expand global research and development capacity, whilst also enhancing the training of marine managers and practitioners to quickly adopt and apply innovative methods. This must include equitable access to advanced research facilities and infrastructure, ensuring gender balance and international inclusivity, particularly prioritising scientists from developing and least developed countries who are the guardians of many of the world's reefs.



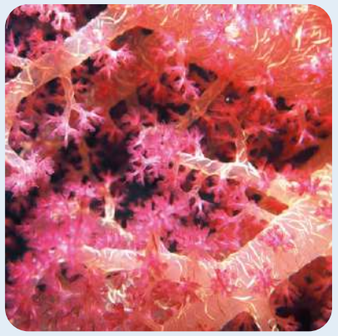
Credit: © The Ocean Agency / Ocean Image Bank

Strategic Pillar



Credit: © Dr. Kenneth Hoadley

Advance promising solutions from concept to proof of concept and empower entrepreneurs to progress solutions from pilot scale to full deployment.



Credit: © Katerina Katopis / Ocean Image Bank

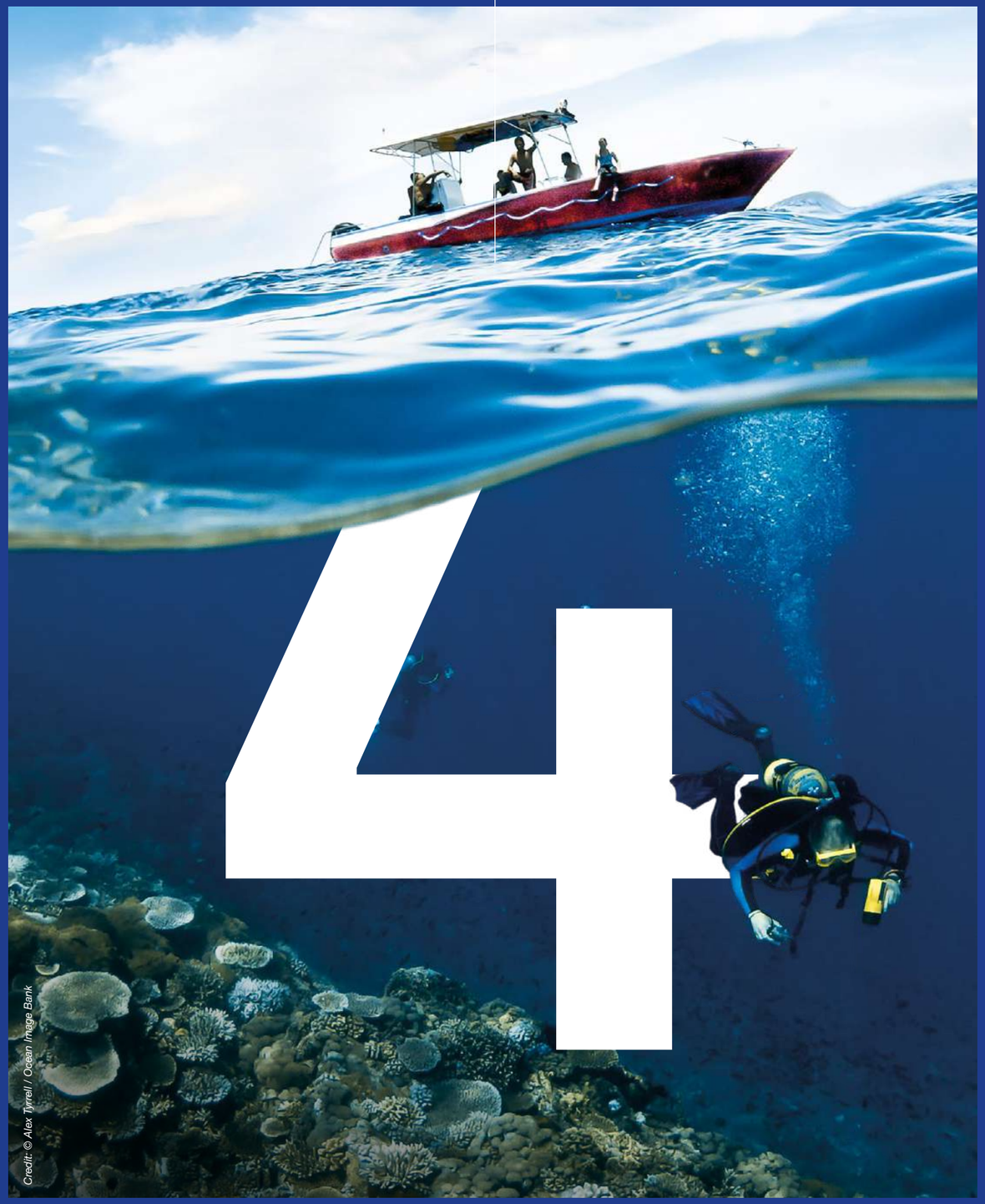
Advance Promising Solutions from Concept to Proof of Concept

This is the process of taking innovative ideas and theories in coral biology research and transforming them into tangible, tested solutions that show effectiveness in real-world or controlled environments. Advancing from the concept stage (where ideas are proposed and hypothesized) to the proof-of-concept stage (where the ideas are experimentally validated) is critical for addressing the growing threats to coral reefs. Proof of concept helps determine whether an idea is scientifically, technically, and economically feasible. This avoids wasting resources on concepts that are impractical or ineffective. Innovative coral treatments also need to be tested for safety, scalability, and long-term efficacy. CORDAP will support projects to this stage, as concrete evidence of potential success makes projects more likely to gain the financial backing needed for further development and large-scale implementation.

Establish Entrepreneurship for Corals

Once research has reached proof-of-concept, it is important to provide researchers with innovative business strategies to create sustainable solutions, which can be implemented for long-term coral conservation and restoration. This includes scalability, monitoring, efficiency and leveraging growing demand. The Entrepreneurship for Corals program will support the design of business models (including mapping revenue streams) to help secure funding from investors and partnerships. It will also support entrepreneurs to track their success and showcase their results. This will create opportunities for coral entrepreneurs to convert their innovative solutions for coral regeneration and revival into viable businesses. This program includes worldwide innovators (not just those with research funded by CORDAP), to attract the most promising talent.

Strategic Pillar



Credit: © Alex Tyrrell / Ocean Image Bank

Empower local stakeholders and coral communities to deploy tools and approaches to protect, restore and adapt corals and reefs to local conditions.

Support Localised Research and Development

Local research and development into coral conservation and restoration would consider unique factors such as water temperature, salinity, currents and biodiversity specific to that region, enabling the development of site-specific conservation strategies. Local research and development ensures that developing nations, which often host some of the most biodiverse reefs, can actively participate in and benefit from conservation efforts. CORDAP supports the development of research and development in low to middle-income countries through projects which scale up restoration efforts in local communities. CORDAP also supports local communities by linking these to ongoing scientific research and by providing training opportunities.

Empower Local Communities

Local communities play a pivotal role in coral conservation and restoration for several reasons, rooted in their geographic proximity, cultural connections and long-term impact on marine ecosystems. Local communities living near coral reefs and are often the first to observe changes such as bleaching, overfishing or damage. Their intimate knowledge of the local marine environment makes them invaluable as frontline guardians. Conservation and restoration efforts are also more successful when local people actively participate in protecting reefs and understand their benefits. Communities can also directly influence land-based activities, such as reducing agricultural runoff, waste disposal, and plastic pollution, which impact reef health. CORDAP will involve local communities and stakeholders as much as possible, through public awareness and support, training opportunities and partnerships. It will also drive interactive engagement with exhibits, citizen science initiatives and artistic collaborations.

Partner with Practitioners

Coral practitioners are individuals or professionals actively engaged in the conservation, management, restoration and study of coral reef ecosystems. They work across various disciplines and contribute to efforts to protect and sustain coral reefs through practical and scientific methods. This includes reef restoration, marine management, local community engagement, policy advocacy and monitoring and assessment. CORDAP will partner with practitioners (including fishermen, scientists, community leaders and local conservationists) to develop local hubs of expertise where they are most needed.



Credit: © The Ocean Agency / Ocean Image Bank

Strategic Pillar



Credit: © Jayne Jenkins / Ocean Image Bank

Drive a global collaborative program with public and private sector stakeholders to build partnerships that enhance research and development, conservation, restoration, and policy reform.

Drive a Collaborative Program with the Public and Private Sector

Collaboration between the public and private sector can help foster innovation and knowledge sharing to help us tackle the challenges facing corals. CORDAP will encourage joint research initiatives between private companies, public agencies, and academia to develop scalable coral restoration solutions. From the public sector better policy, regulations and funding are required aligned with frameworks like the UN Decade of Ecosystem Restoration, SDG 14 (Life Below Water), and the 30x30 marine protection goal. The private sector can provide technology, investment, operational capacity and in return showcase their corporate contributions to conservation. CORDAP will also align and collaborate with global organizations and funds addressing climate mitigation and adaptation provided the vulnerability of corals to climate change and the important adaptive role of coral reefs in providing coastal protection and food security. This will allow for the leveraging of private sector innovations such as AI, robotics, and biotechnology in restoration projects. The end goal is to encourage global researchers, engineers, innovators, organizations and institutions to embed coral conservation and restoration actions into large-scale climate adaptation projects.

Build Partnerships to Enhance Research and Development

Since launching in June 2020, CORDAP has built an influential alliance of partners. Members of CORDAP's governing committee include most of the G20 governments, the International Coral Reef Initiative (ICRI), the Global Fund for Coral Reefs (GFCR), the United Nations Environment Programme (UNEP), the International Coral Reef Symposium (ICRS), the Coral Restoration Consortium (CRC), the Japanese Coral Reef Society (JCRS), and the Great Barrier Reef Foundation (GBRF). CORDAP will continue to engage with these key actors and those in the public sector, private sector, NGOs and academia to foster collaboration. We will proactively share findings with bodies like the ICRI and UNEP and with initiatives such as those funded by the GFCR. With this alliance, we are uniquely positioned to create links and foster global efforts to accelerate research and development.

Perform Communications and Policy Advocacy

Coral reef ecosystems span national boundaries, yet international collaboration is often insufficient, leading to fragmented efforts to address shared threats. Policy efforts to protect and restore coral reefs are often weak due to a combination of systemic challenges, insufficient implementation and misaligned priorities. Inadequate enforcement, fragmented and uncoordinated policies and a lack of evidence-based policy threatens reef survival. CORDAP will advise governments, organizations, and stakeholders on policies to protect coral reefs and promote international cooperation for coral reef conservation, particularly under frameworks like CITES or the Convention on Biological Diversity (CBD). Governments need to create policies that protect coral reefs, regulate unsustainable practices, and incentivize restoration projects.

Strategic Pillar



Credit: © Ginzia Osele Bismarck / Ocean Image Bank

Secure and allocate resources for CORDAP's work.

Facing the coral crisis requires investments in coral conservation and restoration amounting to tens of billions of USD per year. The Coral Reef Breakthrough initiative has called for investments of at **least $12 billion by 2030** to safeguard the future of the world's coral reefs. The opportunity cost of failing to do so over the next 50 years is conservatively estimated at $800 billion in lost tourism, fisheries and coastal protection value.

- The limited funding for coral reef research and restoration poses significant challenges, especially considering the critical role these ecosystems play in biodiversity, coastal protection, and supporting livelihoods.
- Climate funding received just two percent of total philanthropic giving in 2020, and ocean conservation received less than one per cent.
- Global R&D spending is forecasted to reach over USD 2.5 trillion in 2024; however ocean, coral, and reef research remains incredibly underfunded.
- A 2018 assessment by the Conservation for Biodiversity High-Level Panel estimated that the global investment required for coral reefs is **at least** five times greater than current levels.

Funding a future for corals

Costs

All contributions received internationally will go directly to its priority programs.

Administration costs of CORDAP are covered by King Abdullah University of Science and Technology (KAUST) as an in-kind contribution from Saudi Arabia.

Funding per annum

We estimate we will need US$ 30 million each year to be able to deliver on our mission.

** Committed by the Kingdom of Saudi Arabia*

Since the launch of the awards, we have been overwhelmed by the quality of applications for our CAP funding.

It is clear that there are a huge number of viable and worthwhile projects that continue to need our support.

Pillar 6
CORDAP Programs



Coral Accelerator Program (CAP)
$1.5m per project for up to 3 years to drive coral innovation

Coral Local Innovation Program (CLIP)
$100k grant per coral project in low middle income countries

'Moonshot' Challenge Fund
Funds R&D challenges for breakthrough coral reef solutions

Entrepreneurship Program
Turning innovations into scalable coral restoration businesses

The Coral Academy
Train at least 1,500 practitioners to actively manage >7,500 km^2 of coral reefs

Awareness Creation
Mobilizing communities to champion coral conservation

Research and Development

Scaling

Enable & Amplify

Cross-cutting themes: Gender balance, Open access, Trans-disciplinary (scientist, innovators and technologists), Promotion of LMICs.

Credit: © Katerina Katopis / Ocean Image Bank

CORDAP to date

Following four detailed scoping studies, the following R&D technology roadmaps have been published as open source documents:

- Understanding Natural Adaptation and Assisted Evolution of Corals to Climate Change
- Exploring the Frontier of Coral Aquaculture
- Conservation and Restoration of Cold-Water Corals
- Managing the Ecological Risks of Coral Reef Interventions

CORDAP has hosted events at the UN Ocean Conference 2022, COP28 Dubai and the UN Ocean Decade Conference 2024. We also took part in other events including Monaco Ocean Week, MENA Oceans and Our Ocean Conference.

70
coral nurseries established

234
CORDAP has collaborated with 234 institutions worldwide from 60 countries

2,200
corals have been grown in labs and 500+ out-planted

300+
people trained

5
coral-rearing facilities established or upgraded

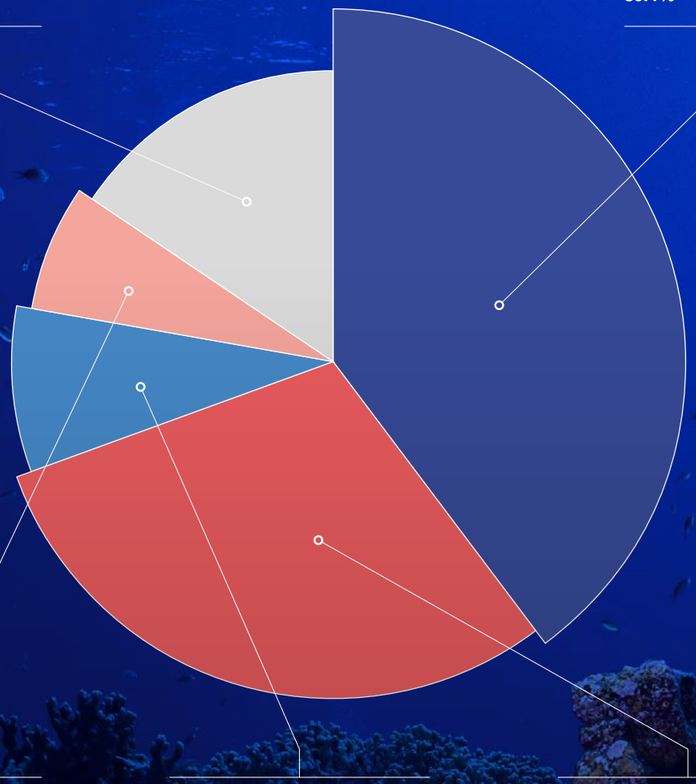
$28m
The Coral Accelerator Program has awarded USD $28million to multinational collaborative teams.

Cordap to date
Funded Projects

CAP 2022 – **14 Funded Projects**
Total Awarded: **USD 18.5 million**

Foundation Science to Support Implementation of Interventions
Amount Awarded (USD): **1,489,102**
% of Total Awarded: **15.2%**

Novel R&D Projects
Amount Awarded (USD): **3,844,556**
% of Total Awarded: **39.4%**



R&D Capacity Building & Local Implementation
Amount Awarded (USD): **653,183**
% of Total Awarded: **6.7%**

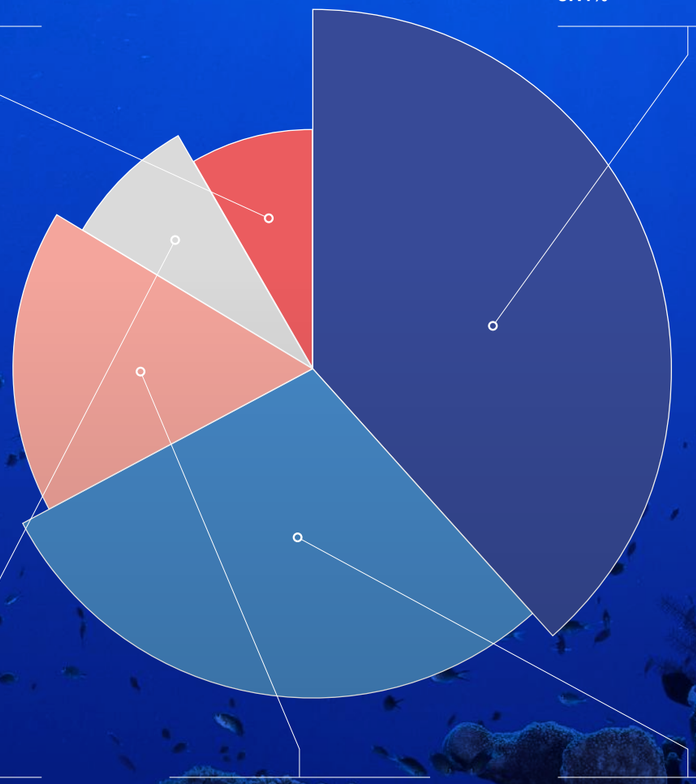
Improving or Scaling Existing Interventions
Amount Awarded (USD): **787,721**
% of Total Awarded: **8.1%**

Translation R&D
Amount Awarded (USD): **2,886,251**
% of Total Awarded: **29.6%**

CAP 2023 – **8 Funded Projects**
Total Awarded: **USD 9.76 million**

Translation R&D
Amount Awarded (USD): **1,459,988**
% of Total Awarded: **7.9%**

Novel R&D Projects
Amount Awarded (USD): **6,925,447**
% of Total Awarded: **37.4%**



Foundation Science to Support Implementation of Interventions
Amount Awarded (USD): **1,459,302**
% of Total Awarded: **7.9%**

R&D Capacity Building & Local Implementation
Amount Awarded (USD): **2,937,599**
% of Total Awarded: **15.9%**

Improving or Scaling Existing Interventions
Amount Awarded (USD): **5,204,163**
% of Total Awarded: **28.1%**

Credit: © Tracey Jennings / Ocean Image Bank

CORDAP to date
At a glance

Since 2021, CORDAP collaborated with
234 institutions from 60 countries (53% LMIC)

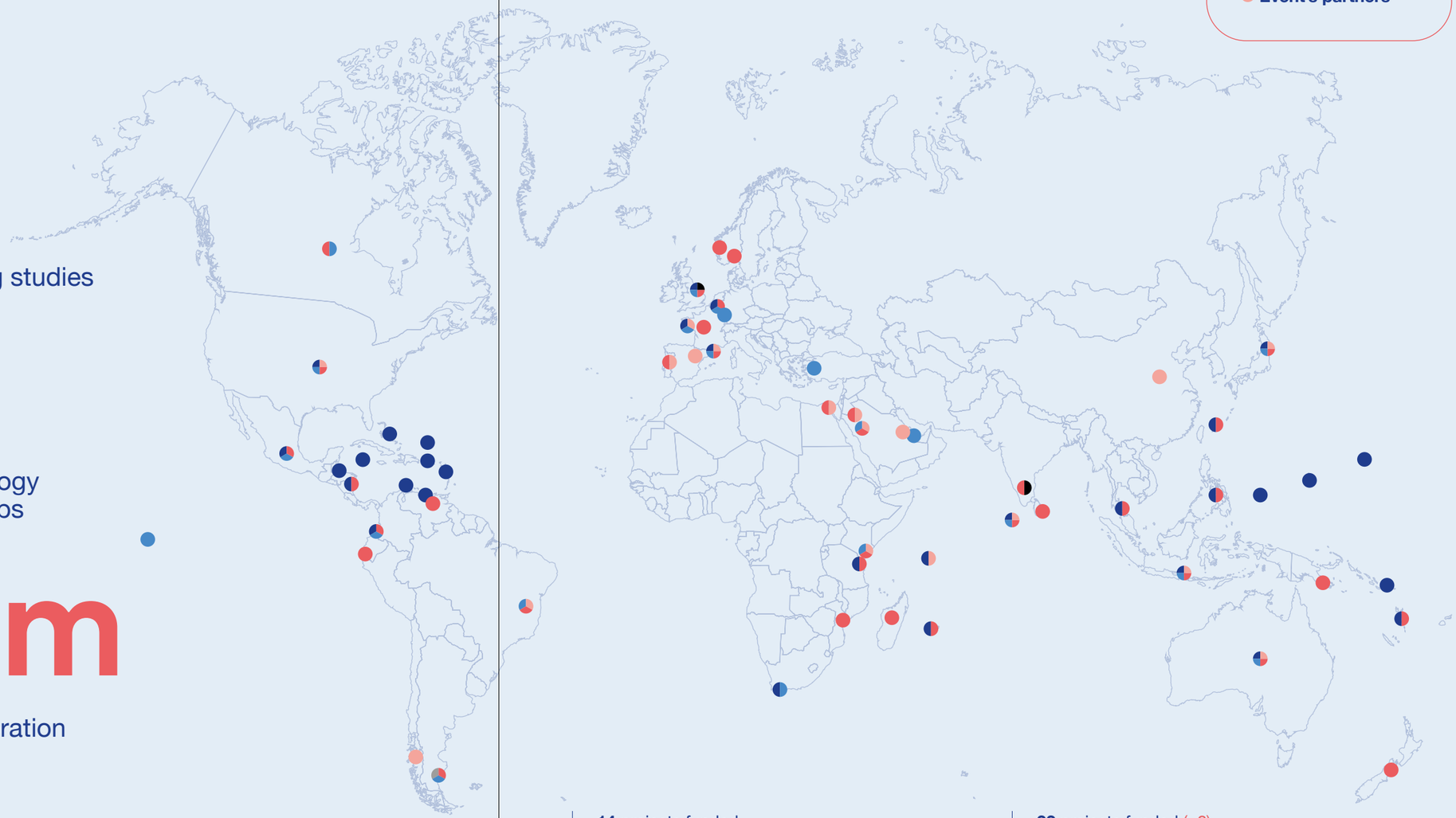
22
Projects funded

6
Scoping studies

>300
Researchers supported

4
Technology roadmaps

>US$28m
Committed for coral research and restoration



CORDAP through time*

• Since 2021

• 2022
35 countries involved
57 institutions involved

• 2023
14 projects funded
188 researchers and research teams supported
3 scoping studies
1 roadmap published
52 countries involved (+17)
165 institutions involved (+108)

• 2024
22 projects funded (+8)
327 researchers and research teams supported (+139)
6 scoping studies (+3)
4 roadmaps published (+3)
60 countries involved (+8)

** Cumulative values*

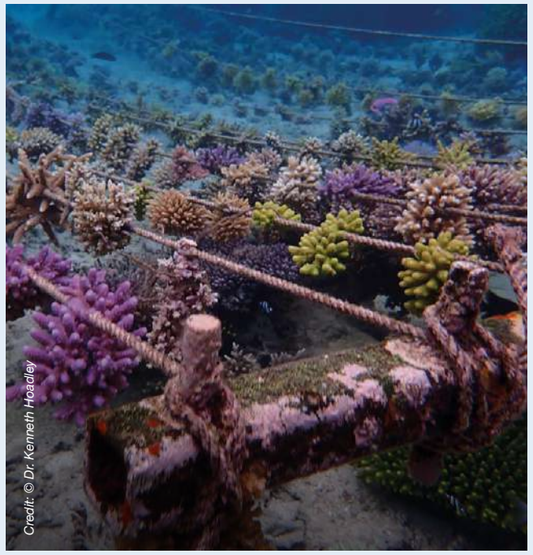
Some of our projects...

Accelerating coral reef conservation, restoration, and sustainable business development in developing nations through the use of ex situ coral spawning

Applicant Countries:
Indonesia

Indonesia is home to the largest coral reef system in the world. It is also one of the most biodiverse. Many of the corals found here are at risk from the aquarium trade, and despite the Indonesian Government limiting the harvesting of ornamental corals from the wild, the majority of these are still illegally collected directly from the reef. Huge advances have already been made in culturing corals, but the more species we can successfully cultivate, the more we can alleviate widespread loss of corals on account of collection pressure. This project will use a novel and portable 'lab in a box' apparatus to reproduce rare and ornamental coral species, reducing the reliance of the aquarium trade on wild corals. The corals grown will also have the potential to be used for reef restoration purposes, leveraging sustainable business practice to fund and support local coral reef conservation.


Credit: © Martin Colognoli / Ocean Image Bank


Credit: © Dr. Kenneth Headley

Empowering community-led coral reef restoration and prioritization in the Maldives with a floating robot

Applicant Countries:
Australia, Maldives

This methodology, which improves larval production efficiencies by 40%, will now be applied in the Maldives. First, coral eggs and sperm are captured in fine mesh nets, with gametes then strategically crossed to generate hundreds of millions of robust, genetically diverse larvae that can be grown on natural limestone tiles and transported to degraded reefs, where they will grow into adult corals. Partners across the Maldives will be trained to use AI-imaging, satellite imaging and a remote controlled submersible robot boat to map reefs for bleaching responses and genetic diversity. This new floating robot can monitor significant changes in study sites and deliver larvae to their new homes.


Credit: © Valeria Pizarro

Novel bio-optical tools for scaling up coral restoration practices in cooperatively managed reef systems in the Pacific

Applicant Countries:
USA, Fiji

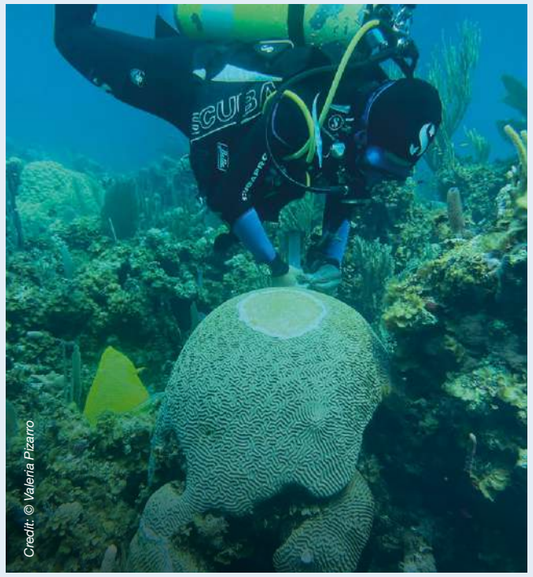
An innovative optical method - namely a submersible fluorometer which monitors fluorescence- is being field-tested to characterize the thermal stress tolerance of the symbiotic algae which live inside corals. The team will develop a low-cost system for measuring the physiology of the algae to help restoration projects select thermally tolerant coral colonies quickly and non-invasively. This user-friendly system processes and integrates large amounts of data and will provide a useful tool for informing restoration projects.

Some of our projects...

Quantifying and operationalizing genetic adaptation for successful coral restoration (CORALADAPT)

Applicant Countries:
Australia, Philippines, Palau

Many corals are currently dying from climate change-related stressors and, unfortunately, if these corals are replanted as part of restoration efforts, they will likely die again in a subsequent heatwave. This is why understanding the capacity for corals to pass on heat tolerance to their offspring could prove critical in the push to create viable new populations. Dr Guest's team spans Australia, Palau and the Philippines and has recently shown that certain corals do indeed have the capacity to transmit thermal tolerance to their offspring. They have used in vitro fertilization (IVF)-like techniques to reproduce corals in a lab and rear them in an underwater nursery, tracking their genetics so they can monitor whether corals bred from more heat-tolerant parents are also more heat-tolerant themselves. The enhancement in coral thermal tolerance, which could reduce mass bleaching under climate change in future generations of corals, is a huge breakthrough in the field of assisted evolution.



Credit: © Valeria Pizarro

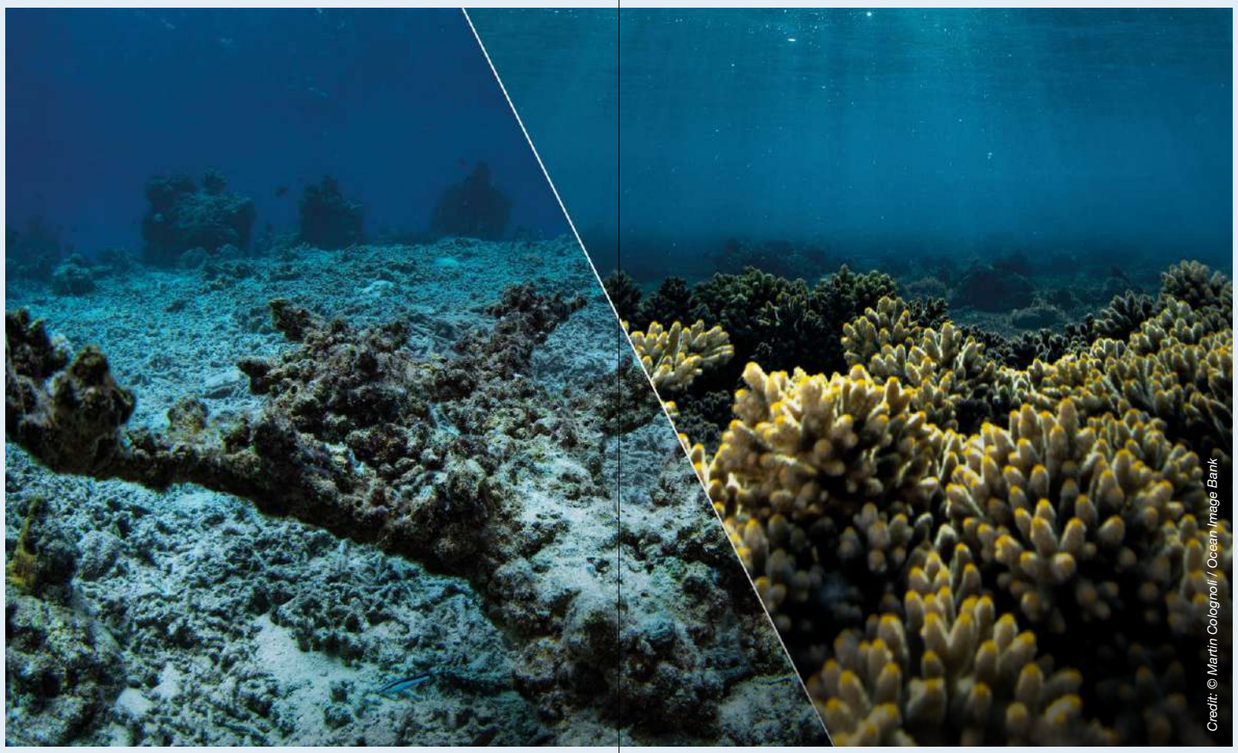
A smart-decision framework for coral restoration (ASSIST) – harnessing resilience for restoration

Applicant Countries:
Malaysia, USA, Germany

Currently, corals bred for nurseries are simply collected from the seafloor. Ideally, scientists would benefit from prior knowledge of the corals' climate resilience, because highly thermo-tolerant corals would be best suited for reef restoration in a warming ocean. The project is working to develop a data-driven system called ASSIST that helps identify the best corals to transplant and grow in nurseries for later reef restoration initiatives. The system will pre-screen corals to determine which represent the most resilient source material for restoration, much in the same way that a surgeon would only opt to transplant a healthy organ (versus one that was merely readily available). The results will be open- source, as the major aim of this project is to empower other coral restoration groups with this "smart selection" framework.



Credit: © Valeria Pizarro


Credit: © Martin Colognoli / Ocean Image Bank

Giving Caribbean corals a future: SCTLD and the use of probiotics in coral restoration projects

Applicant Countries:
USA, Colombia (Caribbean)

Stony coral tissue loss disease (SCTLD) is a highly lethal coral disease that has spread rapidly throughout the Caribbean. The disease affects over 20 coral species and is now present on reefs in 18 countries and territories. There is currently no cure for this infection, however individual coral colonies can be saved with antibiotics (e.g. amoxicillin). This project aims to slow the spread and mitigate the effects of this disease around San Andrés Island, Colombia using probiotics as an alternative to antibiotics. Probiotics have the potential to protect healthy colonies, stop lesion progression and prevent disease transmission. This project will specifically compare four species of corals in colonies around San Andrés Island which have shown potential signs of resistance to the disease, and the results will be used to develop future probiotic treatments.

Appendix 1
Theory of Change table

The Problem Statement

Since the 1950s, over two-thirds of the living coral cover of tropical coral reefs have been lost. The latest scientific evidence suggests that the world has already surpassed 1.5°C of warming above pre-industrial levels, with 2023 and 2024 witnessing unprecedented coral mortality. Current restoration and conservation approaches show promise, however they remain in their early stages of ideation; development and testing and efforts are limited in scale, costly, and struggle to deliver consistent, long-term success under climate change and local pressures.

CORDAP's Desired Impact

CORDAP's impact will be the creation of innovative, affordable and scalable solutions capable of stopping further decline of corals and reefs, and to restore 30% of degraded habitats following the world's pledged global biodiversity goals*.
*Based on the Kunming-Montreal Global Biodiversity Framework targets

The Vision

CORDAP's vision is thriving corals and reefs, fully protected in perpetuity, for the benefit of nature, communities and humanity.

The Mission

CORDAP will unite the world to accelerate global coral research and development to provide the technologies and innovations needed to safeguard the future of corals and reefs in a deteriorating ocean, to preserve the benefits they provide for the environment and humanity.

Impact Targets over 10 Years

- $300M+ of public and private funding mobilised for R&D and capacity building
- 80% reduction in coral outplant costs (from $15 to $3) through innovation
- ≥2.5°C of additional heat tolerance achieved through innovative adaptation technologies
- >$60Bn annual reef-based economic value preserved through enabling science, technology and innovation
- 150M+ reef-dependant livelihoods secured by making solutions possible
- 100K+ coral practitioners trained, with an emphasis on inclusion of LMICs
- 100+ coral restoration ventures enabled
- Positively impact regional, national and international policy decisions which safeguard corals.

Strategic Pillar 1

Enhance research and development solutions currently being explored for coral reef and deep-water coral protection, restoration and adaptation and drive innovation to develop new research and development solutions.

Objectives	Activities and Approaches	Examples of Successful Outcomes
The Preservation and Conservation of Existing Corals	• Mitigate local pressures, including land-based pollution and pests • Participatory, active, and effective enforcement of existing rules • Nature-based solutions to improve water quality • Understanding reef conditions and health trends • Hybrid reef technologies that contribute to coral conservation while repairing coastal protection benefits.	• Reduction in sedimentation and pollutants impacting corals • Enduring coral resilience for heat stress and disease • Nature-based improvements to water quality and clarity • Improved data on reef conditions, health trends, bleaching events and disease prevalence • Adoption of CORDAP hybrid reef technologies by large coastal adaptation projects in subtropical and tropical regions.
Develop Assisted Evolution for Corals	• Selective breeding for more thermal resistance, disease resistance etc. • Microbiome manipulation of both photosynthetic and non-photosynthetic members, through pre- and probiotics • Genetic modification • Exposure to stress • Assisted symbiont evolution	• Lower mortality rates under thermal stress • Heat resilient symbionts • Accelerated growth rates • Disease-tolerant genotypes and microbiomes • Higher reproductive success including larval production, settlement and recruitment • Enhanced stress resistance • Higher survival rates in out-planting trials • Enhanced ecosystem functions in restoration projects
Improve Aquaculture and Automation for the Production and Planting of Coral	• Micro-fragmentation of corals for aquaculture • Larval rearing • Selective breeding for aquaculture • Automated coral farming including robotic coral seeding, 3D printing of coral substrates and automated monitoring systems • AI and machine learning for coral growth optimization including environmental sensors and automated feeding systems • Large-scale coral planting using automation including underwater drones or self-deploying coral pods (to release larvae over time) • Marine biotechnology such as probiotics or genetic engineering	• Higher growth rates in aquaculture facilities from fragmentation or larval development • Higher survival rates of cultured corals • Optimal nutrient and environmental conditions for coral growth • Lower costs per coral colony grown • Higher survival rates of out-planted corals
Research Cold-Water Corals (CWC)	• CWC research expeditions • Widen participation in CWC research with more representation from the Global South • Novel research methods to improve data around CWC biology, such as taxonomy, reproduction, growth and feeding	• Expanded assessments of the conservation status and threats to CWC globally • New CWC research sites established, and new species identified and classified • New insights into CWC growth models, reproduction and feeding mechanisms • Development of scalable CWC restoration technologies
Limit Early Life Stage Mortality of Corals	• Controlled breeding and larval rearing • Assisted reproductive technologies • Understanding post-settlement mortality • Addressing environmental stressors which impact early life mortality • Scaling up existing interventions	• Increased larval survival rates in a lab and in wild settings • Increased settlement success on appropriate substrate and skeletal deposition in early stages • Enhanced post-settlement survival rates • Faster growth rates in juvenile corals • Lower disease and predation rates • Increased presence of thermally tolerant species in juvenile corals
Improve Intervention Planning, Risk, and Monitoring for Coral Restoration	• Creation of risk assessment frameworks to evaluate ecological, financial, and logistical risks • Development of early warning and monitoring systems • Data-driven decision-making models to guide restoration • Establishing global methodologies for tracking coral health survival post-restoration	• Restoration efforts are strategically placed in locations with the highest probability of success • Early identification of bleaching events, pollution or disease outbreaks • Standardized, scalable monitoring protocols ensure consistent assessment of restoration success. • Development of AI models to better predict restoration risks and success • More cost-effective restoration and resource use
Create and Integrate Blended Artificial and Natural Reefs	• Developing hybrid reefs that combine man-made structures with natural organisms such as oysters and corals • Materials like pH-neutral concrete and biodegradable substrates to improve environmental compatibility • 3D printing of structures for restoring complex habitats	• Enhanced connectivity between artificial and natural reefs • Faster and more cost-efficient restoration methods • Automated deployment tasks • Biomimetic reef tiles to scale coral growth • Adaptive restoration if structures fail

Strategic Pillar 2

Foster capacity-building, collaboration, and knowledge-sharing among scientists and practitioners across the entire socioeconomic spectrum, with particular attention to those in middle and low-income nations.

Objectives	Activities and Approaches	Examples of Successful Outcomes
Facilitate Information Access and Sharing	• Develop more open-access research data • Foster collaboration with existing platforms • Organise expert panels and symposiums to share knowledge • Encourage community engagement for data collection • Foster interdisciplinary collaboration • Encourage CWC community coordination and engagement • Share CWC data freely and more effectively in existing platforms	• Open access journals, white papers and policy briefs published • New collaborative research projects between teams across socioeconomic spectrums • Development of open access online training modules and e-learning platforms • Better species identification by practitioners, reducing taxonomic gaps and improving conservation strategies. • Improved CWC research
Provide Advanced Research and Development Training	• Scholarships to provide training to emergent coral scientists • Create funded postdoc positions in coral restoration, climate resilience and reef monitoring • Encourage global universities to provide training opportunities	• Increase project proposals for coral R&D projects • More scientists and practitioners joining coral conservation and restoration groups • New projects generated by CORDAP-trained scientists
Establish a Coral Academy	• Establish a groundbreaking initiative to rapidly equip coral reef practitioners with the skills they need to climate-proof their local reefs • Train practitioners in online and in person courses for proactive implementation and management of measures • Provide divemaster courses for eco-tourism	• Training and capacity-building programs for practitioners who will in turn train local practitioners. • Increased proactive management or reefs through training and capacity building programs for practitioners. • Generation of local jobs based on healthy reefs in MPAs, tourism, research, fisheries etc.
Ensure Opportunity and Engagement are Given to Low- and Middle-Income Nation Partners	• Widen participation in research with more representation from the Global South • Improve communications and activities geared towards LMIC scientists and practitioners • Provide grants or scholarships for LMIC participants	• Increasing numbers of scientists and practitioners from LMIC nations • Improved livelihoods for coral communities

Strategic Pillar 3

Advance promising solutions from concept to proof of concept and empower entrepreneurs to progress solutions from pilot scale to full deployment.

Objectives	Activities and Approaches	Examples of Successful Outcomes
Advance Promising Solutions from Concept to Proof of Concept	• Selection criteria of viability, scalability, ecological impact, regulatory feasibility. • Provide testing facilities • Publish peer reviewed research to establish viability	• Pilot project deployments • Prototype developments • Scalable operational models • Technology transfer & knowledge sharing • Industry partnerships • Permits received for use of technologies on reefs • Securing venture capital, government funding, or public-private partnerships
Establish Entrepreneurship for Corals	• Train entrepreneurs to advance coral R&D technologies • Advance partnerships between researchers, funders and entrepreneurs to: - develop IP strategy with scientists - develop stakeholder engagement - consider ethical and environmental risks - develop cost- benefit analyses and business models - navigate policy and legal frameworks	• Increase the number of jobs in marine bio-tech • Increase the number of patented or widely adopted innovations for coral restoration and conservation • New businesses started to restore corals by entrepreneurs from all socio-economic backgrounds • Links with universities and companies from varied geographies

Strategic Pillar 4

Empower local stakeholders and coral communities to deploy tools and approaches to protect, restore and adapt corals and reefs to local conditions.

Objectives	Activities and Approaches	Examples of Successful Outcomes
Support Localised Research and Development	• Ensure opportunity and engagement are given to low- and middle-income nation researchers • Provide training for local coral scientists • Research of accessible, artificial, reef structures from local materials • Introduction of low-tech propagation methods • Establish micro-grants for smaller LMIC projects • Empower local scientists and communities to understand their reefs' unique stressors • Encourage research tailored to local species, climate conditions and ecosystem interactions	• Amplified local knowledge of reefs, fish migration and ocean dynamics • Combined modern science with traditional conservation techniques • A skilled local workforce with long-term commitment to reef restoration • Coral communities with the ability to respond immediately to local stressors like bleaching or disease
Empower Local Stakeholders and Communities	• Community training programmes with hands-on coral restoration workshops • Develop multilingual educational content tailored to local contexts • Use VR and AI powered tools for virtual reef restoration training • Support sustainable fishing cooperatives • Offer certifications in reef monitoring, restoration, and marine resource management	• Increase in reef-friendly tourism • Coral communities become reef-guardians • Local pressure applied on policy-makers for fishing limits and MPAs • Women and indigenous communities can develop new income streams from reef conservation
Partner with Practitioners	• Knowledge-sharing to ensure R&D breakthroughs reach on the ground practitioners • Train local conservation groups and scientists to restore corals • Train local dive operators and fisherman about corals • Encourage local leaders to use digital storytelling and social media advocacy	• Local practitioners have ownership of ongoing projects • Local collaboration with businesses to create restoration tourism programs • Revenue from eco-tourism goes to local restoration • Local data is collected to influence policy • Reduction in outside intervention in reef conservation and restoration

Appendix 1
Theory of Change table

Strategic Pillar 5
Drive a global collaborative program with public and private sector stakeholders to build partnerships that enhance research and development, conservation, restoration, and policy reform.

Objectives	Activities and Approaches	Examples of Successful Outcomes
Drive a Collaborative Program with the Public and Private Sector	• Further align with government agencies, MPA management organisations, NGOs and research institutions • Continue to engage with global initiatives like the GFCR and UN Ocean Decade Program • Engage Environment, Fishery and Tourism industries • Develop an aligned global program to tackle coral decline	• White papers and policy briefs published • Meetings with policy-makers to lobby for improved legal protection for reefs • MOUs or commitments from the private and public sector to support conservation and restoration • Integration of coral restoration into climate adaptation and marine spatial planning
Build Partnerships to Enhance Research and Development	• Maintain the alliance of coral partners • Develop further partnerships to enhance research and development	• Host a "Corals in Crisis" summit • Mobilize multi-sector partnerships to advance policy, innovation, and conservation strategies to halt and reverse coral decline
Perform Communications and Policy Advocacy	• Build public and stakeholder support for CORDAP initiatives • Drive engagement with governments, businesses, and scientific communities • Ensure transparency and accountability in R&D investments • Mobilize funding and policy backing for large-scale coral restoration • Focus on hope and action-oriented narratives rather than just threats to coral reefs • Develop engaging social media campaigns, including with marine influencers • Develop a media strategy including op-eds and press events • Create transparent impact reports	• Influence national and global policies for stronger coral protection and restoration • Increased media coverage of the coral crisis driven by compelling storytelling and science-driven advocacy • Successful social media campaigns led by marine influencers • Transparent reporting of R&D advances to maintain good relationships with stakeholders • Increase global understanding and awareness of CWCs, ensuring they are included in the agenda of policy meetings, such as biodiversity and climate COPs

Strategic Pillar 6
Secure and allocate resources for CORDAP's work.

Objectives	Activities and Approaches	Examples of Successful Outcomes
Secure Resources	• Earn commitments for an R&D endowment fund • Resource CORDAP's commitments for a further $20M per year • Design sustainable funding mechanisms, such as blue bonds, impact investments, carbon and blue carbon credits • Apply for public sector funding and international grants to scale efforts	• Financial resources raised • Investment growth and annual returns (%) • A high retention rate of annual donors/members • Growth in social media and crowdfunding participation • Several corporate and government partnerships secured
Allocate Resources Transparently and with Accountability	• Ensure a streamlined application and administration process to ensure that applying to and participating in the program are not burdensome. • Have a robust and methodological review process to select projects and participants. • Be guided by a diverse demographic of world-leading experts.	• A high rate of projects with successful outcomes • Development of successful projects which scale and quicken coral conservation and restoration

Assumptions

• Active coral reef conservation and restoration is necessary to maintain biodiversity and ecosystem services. • Affordable and scalable scientific and technological solutions can be developed and implemented to effectively conserve and restore corals and reefs. • Building capacity in developing countries is essential for the successful implementation and sustainability of conservation and restoration efforts.	• Sustained funding is required to maintain the long-term viability of conservation and restoration efforts. • International governments will continue to address other risks facing corals including climate change.

Risks and Mitigations

Insufficient funding	The $100M founding commitment from Saudi Arabia has allowed CORDAP to launch its first funding program and deliver the first technology roadmaps. This is a powerful tool for leveraging additional funding. CORDAP will continue to fundraise for coral R&D from the public and corporate sectors to meet its investment target. Strong relationships will be built with donors and partners and we aim for our track-record to speak for itself.
Inability for grantees to discover, or invent, effective affordable technologies and solutions to protect and restore corals and reefs at scale	CORDAP is grounded on the believe that human inventiveness can overcome some of the current scientific and technological limitations limiting the success in conserving and restoring corals and reefs at scale. Mitigations include attracting the best researchers, choosing the most promising projects, funding projects of sufficient value to address the challenges realistically, implementing the highest quality review of proposals received and a constructive feedback mechanism between the review feedback and applicants. Additionally coordinating and connecting researchers to ensure the best teams work on the most pressing challenges and developing technology roadmaps to align and guide research activities.
Resistance to novel solutions or lack of local engagement	To ensure local engagement and uptake of the technologies and approaches being developed, both CORDAP and proponents for funding will engage local communities, governments, and other stakeholders from the outset. This will include participatory approaches to research, capacity-building, and decision-making, as well as efforts to build local ownership and stewardship of affected coral reef ecosystems. CORDAP aims to ensure it is inclusive and engages local communities, governments, and other stakeholders from the outset.
Unintended consequences, i.e. ecological, social, or economic impacts that were not foreseen	To mitigate the risk of unintended consequences, CORDAP requires robust risk assessments that evaluate the potential ecological, social, and economic impacts of any new CORDAP funded technologies or approaches before they are introduced are conducted. A CORDAP scoping study has been undertaken to build on existing work and activities on ecological risk, document the current state of knowledge in managing ecological risk of reef interventions, identify knowledge gaps, challenges and barriers to implementation, opportunities to improve practices and to identify priority areas for further work in this area. CORDAP will also undertake comprehensive risk management at the project level.
CORDAP is not viewed or understood as a unique and essential initiative	Prepare a SWOT analysis of all similar organisations and clearly define how CORDAP is different and how it addresses a different need from other existing entities. Ensure all employees are trained to clearly define the different work being performed by CORDAP and why it matters.

Appendix 2
Assumptions for Impact Targets

In its 2018 Special Report on Global Warming of 1.5°C, the IPCC projected that if global temperatures rise by 1.5°C above pre-industrial levels, **coral reefs are expected to decline by 70–90%**. This estimates we will lose 70-90% of coral reefs from climate change impacts alone, without including impacts from pollutants, overfishing etc. We are making the assumption that scientific research and development could slow or reverse this trajectory.

Global estimate of shallow **coral reefs is 348,361 km²**. As of 2020, approximately **14% of the world's coral reefs**—equating to about **11,700 km²**—were lost between 2009 and 2018 due to degradation. This decline was primarily driven by mass coral bleaching events, ocean warming, pollution, overfishing and coastal development.

Coral reefs contribute an estimated **US$2.7 trillion annually** in goods and services. The economic value of ecosystem services provided by coral reefs varies significantly depending on factors such as location, reef health, and the specific services evaluated. Estimates range from approximately **US$3,500 to over US$1 million per km² annually**.

1 km² of well maintained, healthy coral reef is associated with **100 local jobs**.

So to preserve >$60Bn of annual reef-based economic value and secure 150M+ reef-dependent livelihoods, the assumption is the avoidance of loss of reefs within the foreseeable future, in line with effective conservation and restoration of reefs consistent with the Kunming-Montreal global biodiversity framework. These figures represent baseline or minimum expected benefits of preserving or restoring coral reefs.

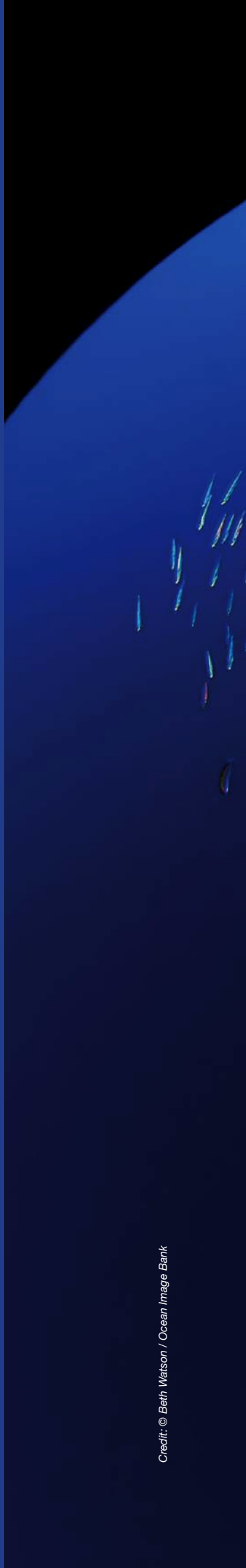
Appendix 3
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G20 Coral Research
& Development
Accelerator
Platform



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The Coral Research & Development Accelerator Platform (CORDAP) Theory of Change

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