

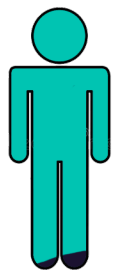
# Current and Future Perspectives on the Blue Carbon Economy



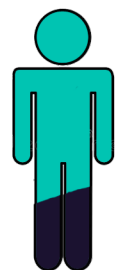
# Human population by 2050



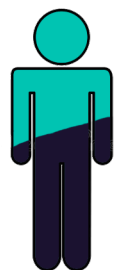
3 billion  
1960



5 billion  
1987



6 billion  
1999



8 billion  
2023



9.7 billion  
2050

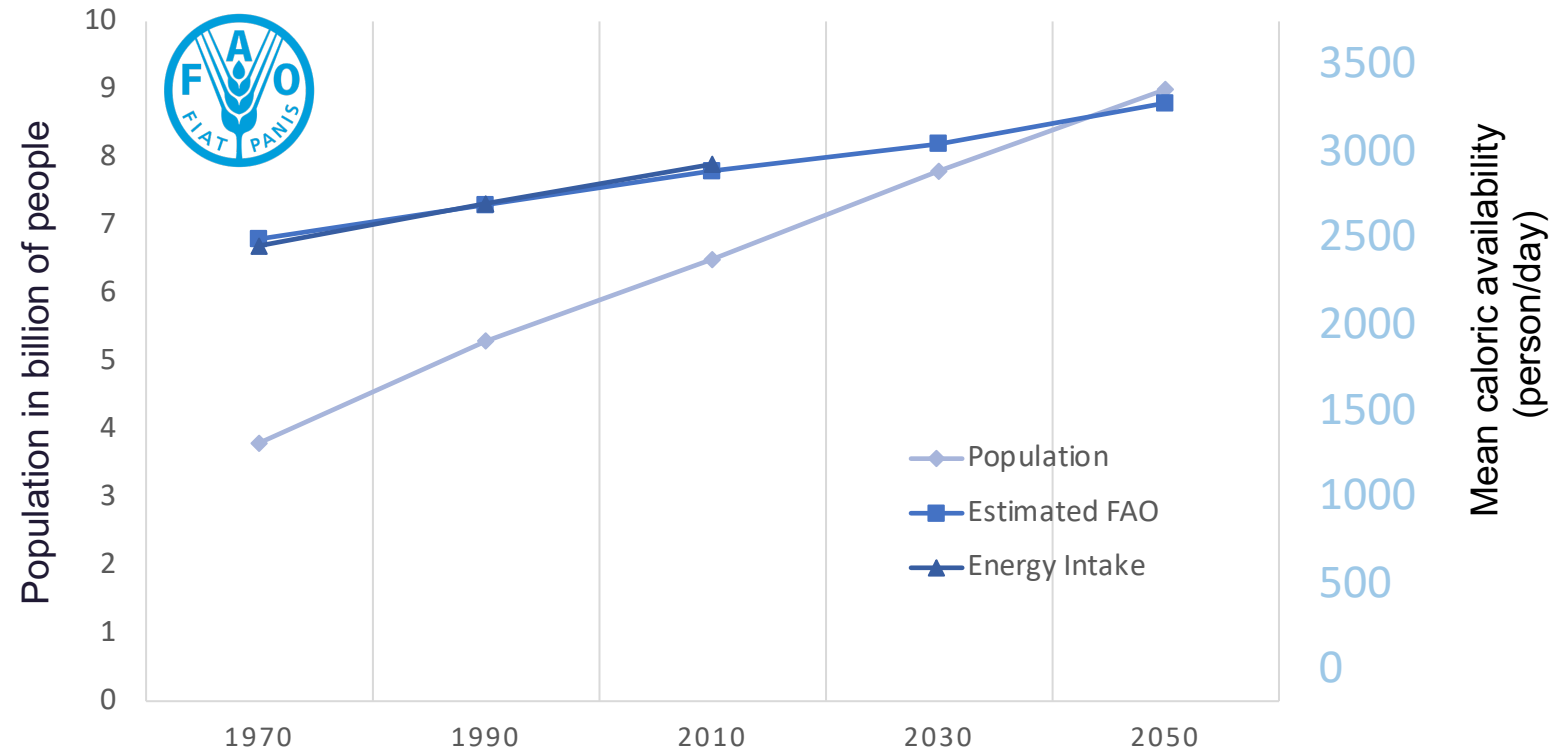


# World population and food security by 2050



**Our future food security will depend on safeguarding our land, soil, and water resources**

(2021) Qu Dongyu,  
General Director FAO



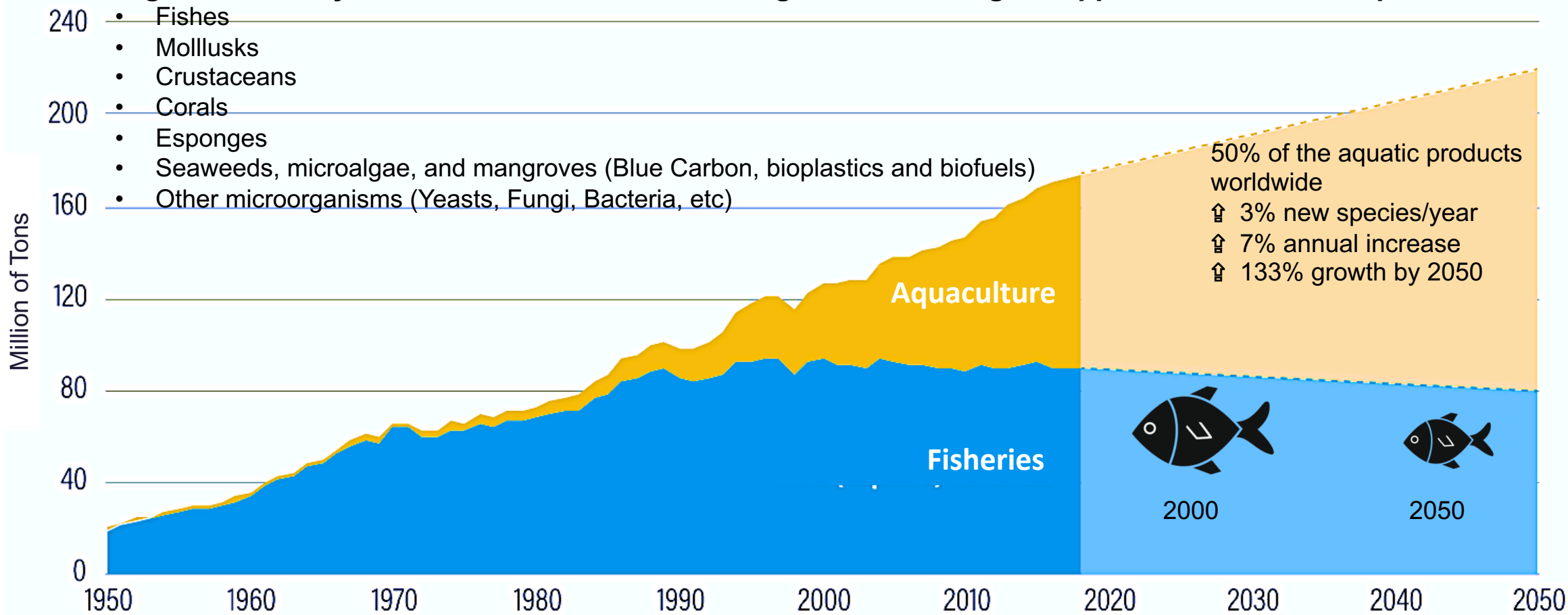
**3.1 billion people rely on aquatic foods as the main protein source**

# Sustainable aquaculture by 2050



**High biodiversity for conservation, climate change, biotechnological applications, and food production:**

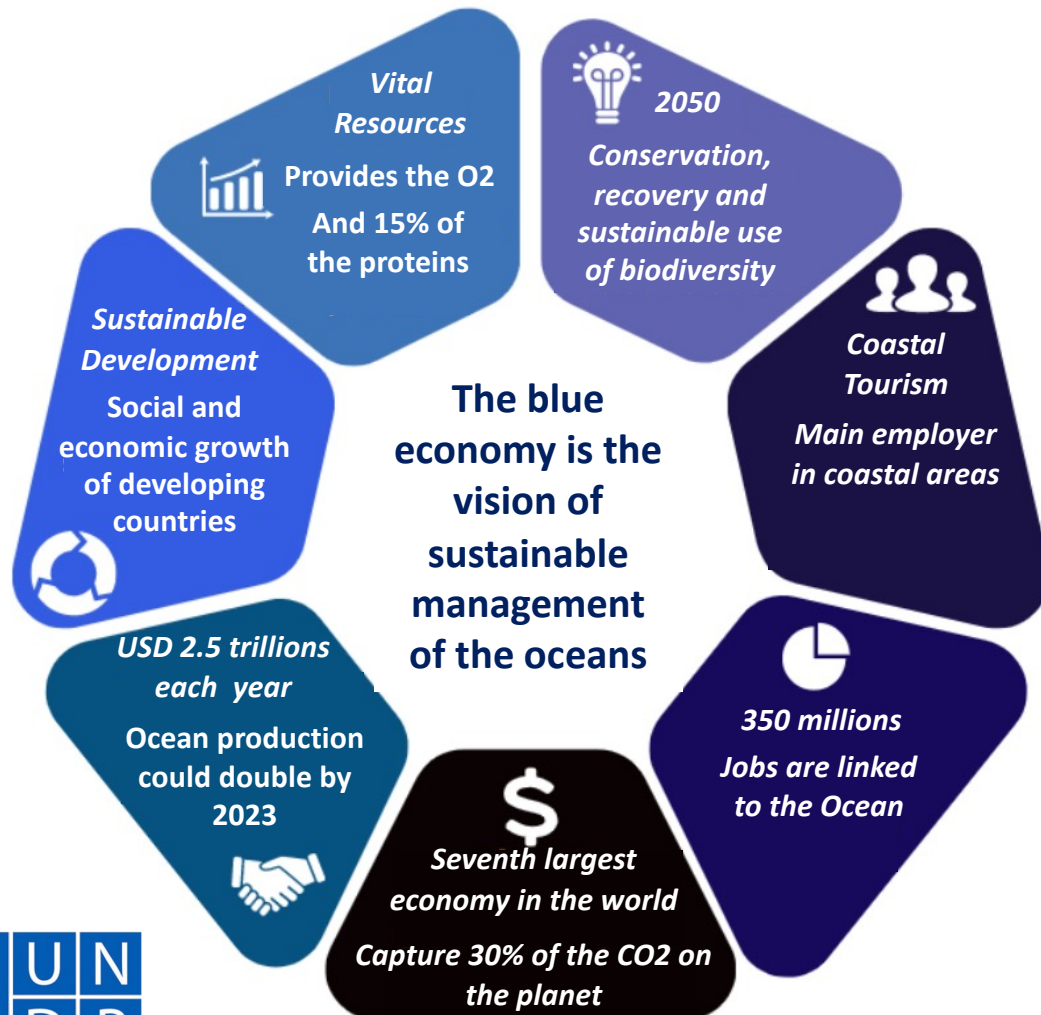
- Fishes
- Mollusks
- Crustaceans
- Corals
- Sponges
- Seaweeds, microalgae, and mangroves (Blue Carbon, bioplastics and biofuels)
- Other microorganisms (Yeasts, Fungi, Bacteria, etc)



WORLD  
RESOURCES  
INSTITUTE



# Blue economy model 2050



Value of the Ocean: **USD 24 trillion**  
 Dependent people: **~3.5 billion**

## The Ocean:



**Absorbs 90% of the heat produced on the planet**



**Is where 90% of commercial products are transported**



**Produces 30% of oil and gas**



**Provides environmental, social, and economic well-being for coastal communities**

# Blue Carbon Ecosystems (BCEs)



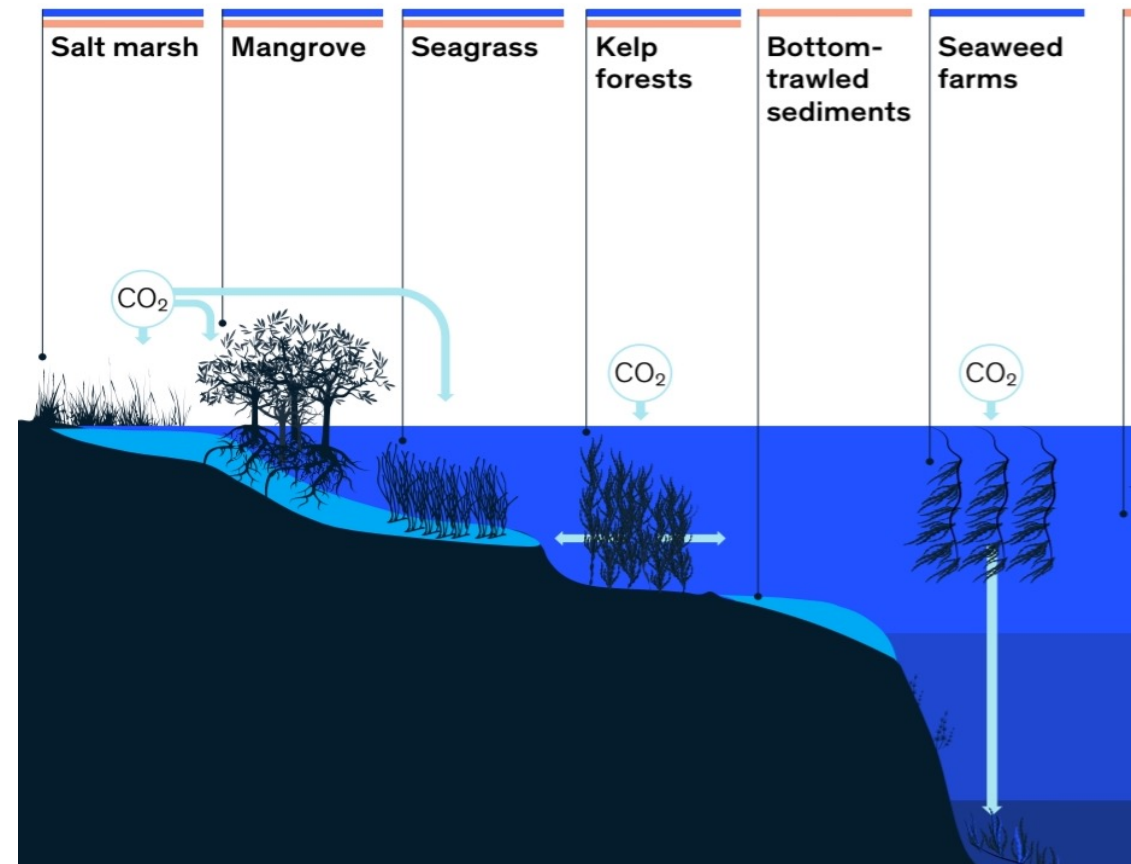
## Blue carbon is stored in coastal ecosystems:

- Salt marshes
- Mangroves
- Seagrass meadows
- Seaweed/Kelp forests

## Main services provided:

- Food and climate security
- Biodiversity conservation and ecotourism
- Water filtration and disease control
- Coastal protection and ocean acidification buffering

BCEs are responsible for 50% of the carbon stored (75 GtCO<sub>2</sub>) in the ocean despite just covering 2% of the ocean's surface



# Mangroves services value

Annual Value: ~ **USD 462-798 billion**  
 Valor 1 Ha.: ~ **USD 33-57 thousand/year**  
 Dependent people: ~**120 million**

## Coastal protection:

5 times more profitable and effective than seawalls. Reduce 50 % of storm impacts



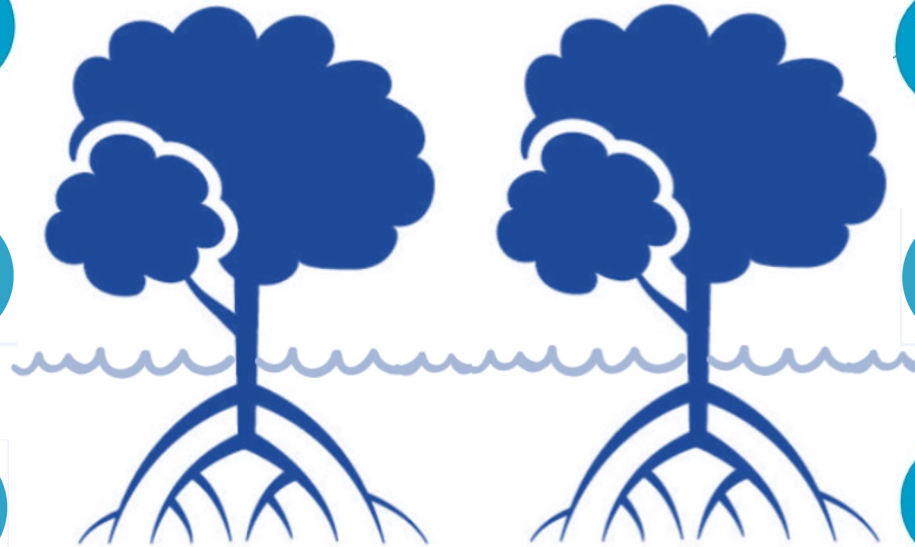
## Climate Change:

Covers ~0.1% of the planet, but captures and stores 8-9 tons of CO2/Ha (3-5 times more than forests).



## Wood:

For building materials and firewood



## Tourism:

Kayaking, fishing, wildlife, tours, etc.  
**USD 1,079/Ha.**



## Water filtration:

2-5 hectares can filter 1 hectare of aquaculture farms.



## Fisheries and food production:

Habitat for more than 3,000 species and enhance 25% the productivity of coral reefs

# Coral reefs services value



Current Value: ~**USD 9.9 trillion**  
Annual Value: ~**USD 375 billion**  
1 Ha. Value ~**USD 1.25 million/year**  
Dependent people: ~**500-1000 million**

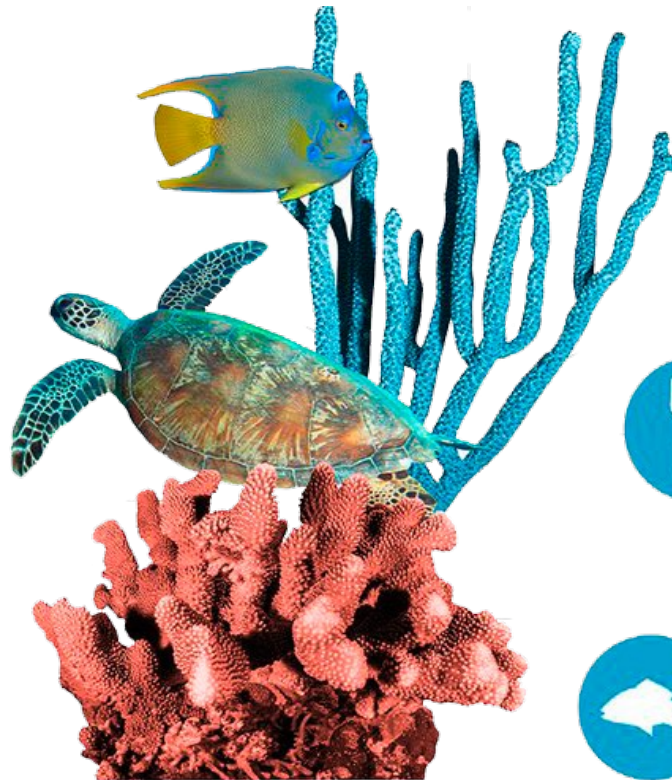
**Coastal protection:**  
Reduce 97% of wave energy.  
**USD 272 billion/año**



**Climate Change:**  
Cover <1% of the planet, but capture and store 70-90 million tons of CO2.  
Associated seagrass 8 tons of CO2/Ha



**Medicine:**  
Anticancer and antivirals



**Tourism:**  
70 million trips/year  
**USD 36 billion**



**Food Production:**  
5-10 tons of fish/km<sup>2</sup>/year.  
**USD 29.8 billion**



**Biodiversity:**  
Habitat of the 25% of marine species



# BCEs and coral reefs are threatened



¿2030 - 2050?



 Lost: Coral Reefs **50%**, Tidal Marshes **50%**, Mangroves **35%**, Seagrass meadows **30%**

 70-90% of these ecosystems are threatened

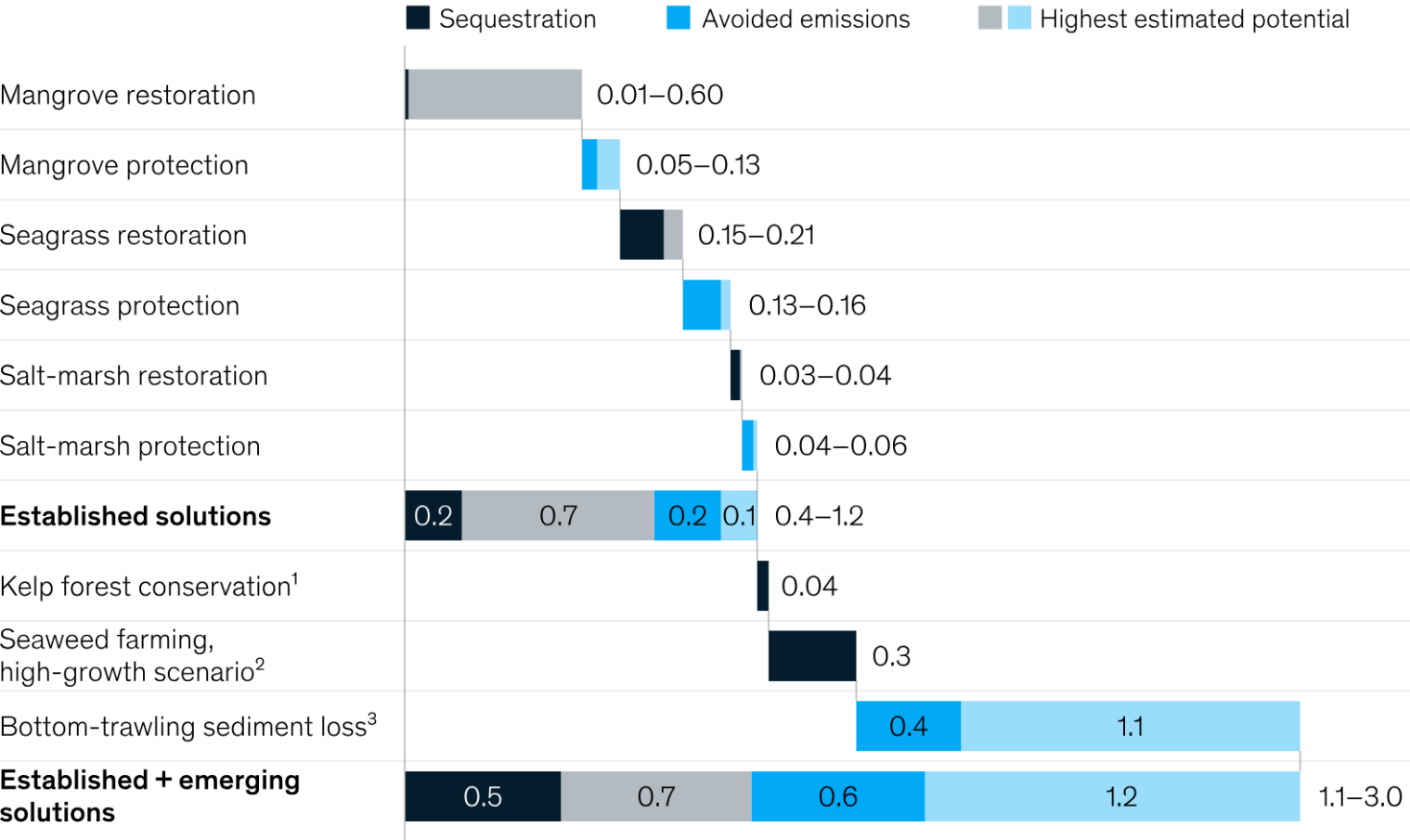
 Destruction of the natural, social, and economic capital (BCEs release 1 GtCO<sub>2</sub>)

 They could disappear in the next 3 decades

# Blue carbon capture potential of BCEs by 2050



Abatement potential from established and emerging blue-carbon solutions by 2050, GtCO<sub>2</sub> equivalent per year







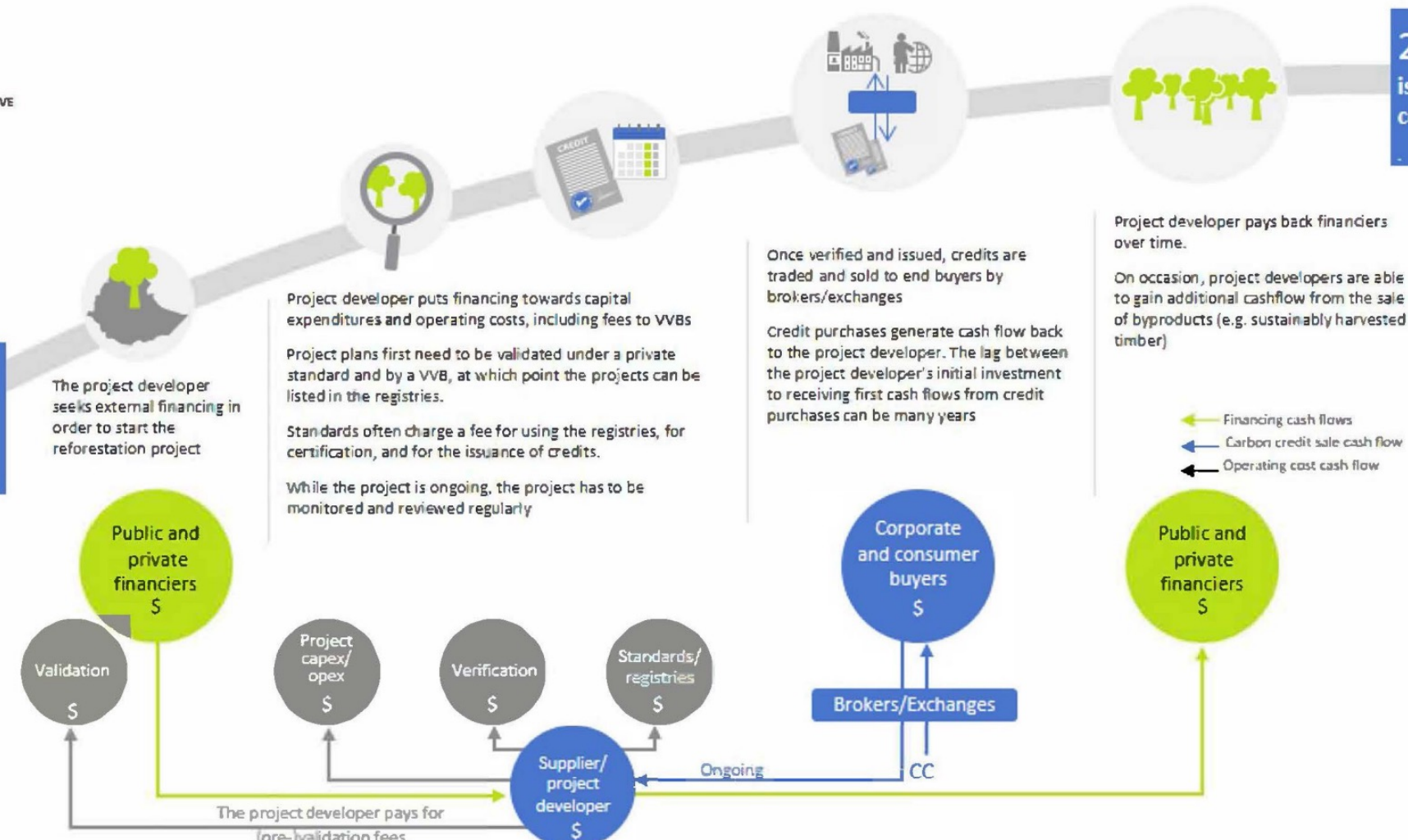
# Life cycle and cashflow of a carbon credit



ILLUSTRATIVE

2050  
issuances  
completed

2020  
project  
starts

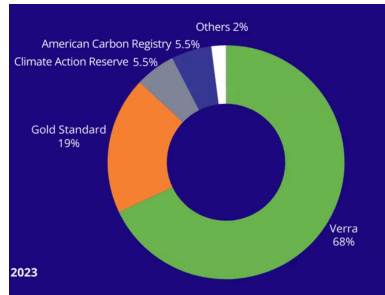
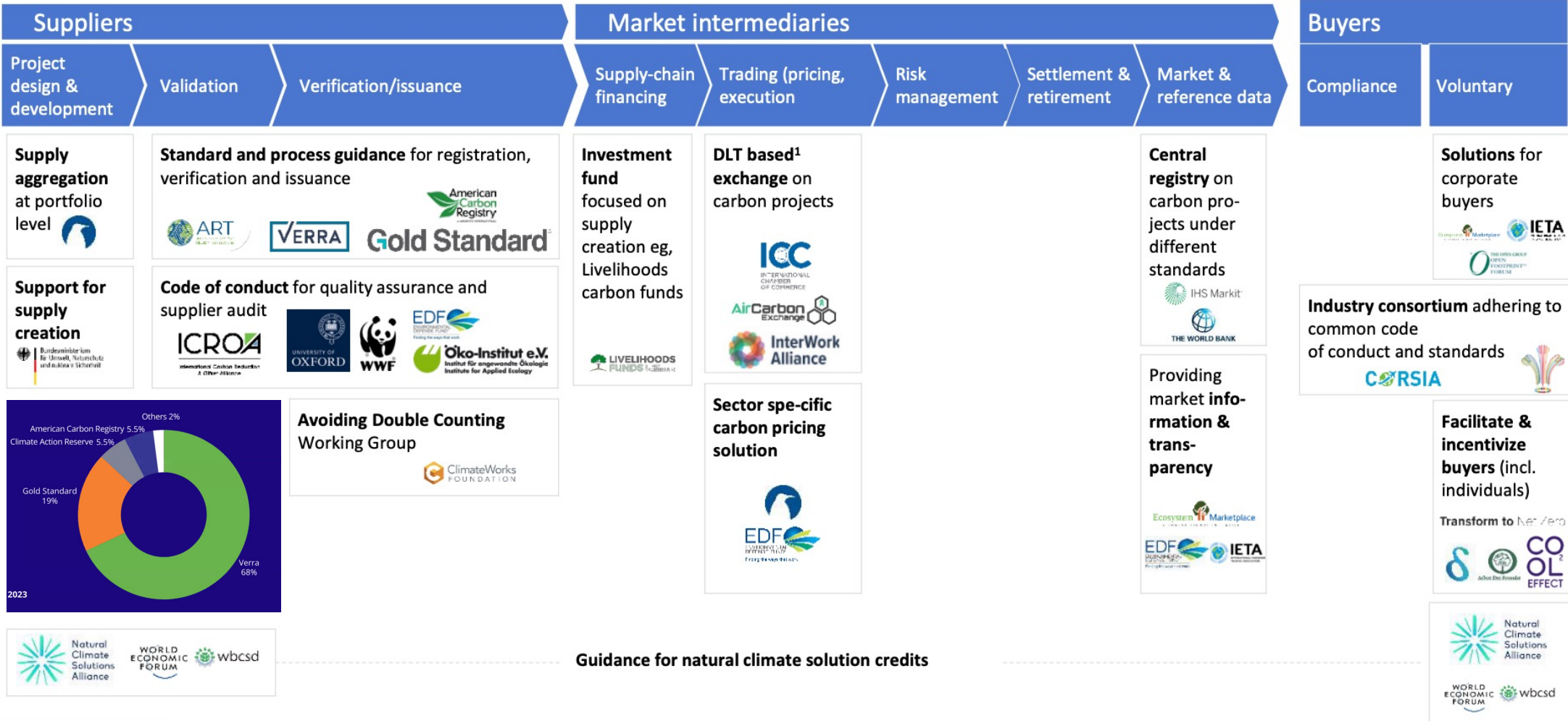




# Carbon market initiatives



Ongoing initiatives



# Voluntary and compliance carbon markets



## VOLUNTARY MARKETS

Function in parallel to compliance markets and **do not fulfil a legal obligation.**

**Demand** for voluntary carbon credits driven by growing **voluntary climate action, pledges and stakeholder pressure.**

- Companies first reduce emissions as much as possible
- Companies neutralize the non-abated remainder of their emissions by purchasing voluntary carbon credits

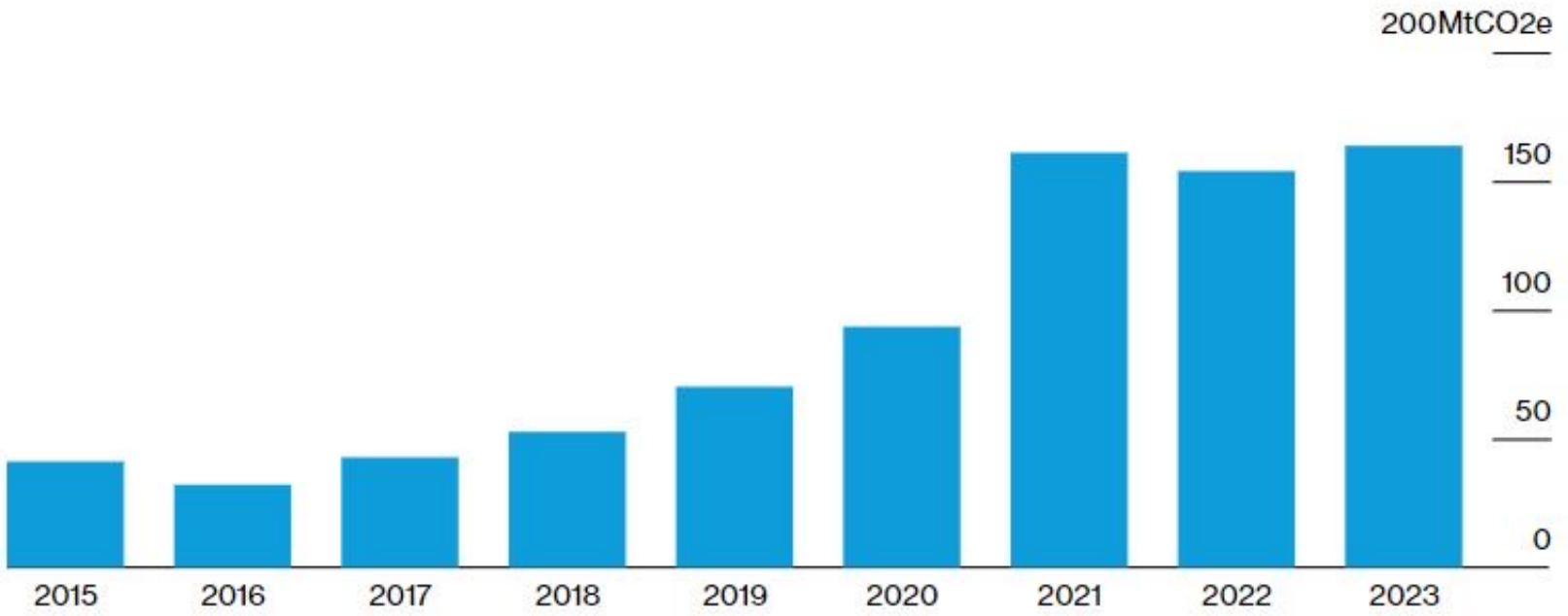


## COMPLIANCE MARKETS

Enable countries and companies to fulfil **obligations under the Paris Accord**

- For countries, current obligations are driven through the Kyoto Protocol (e.g. Clean Development Mechanism)
- For companies, obligations arise through emission trading schemes or national carbon taxes some that allow use of offsets.

## New Offsetting Record Carbon offset retirements, by year



Source: BloombergNEF, Verra, Gold Standard, American Carbon Registry, Climate Action Reserve  
Note: Chart is based on public data from the four largest carbon offset registries.

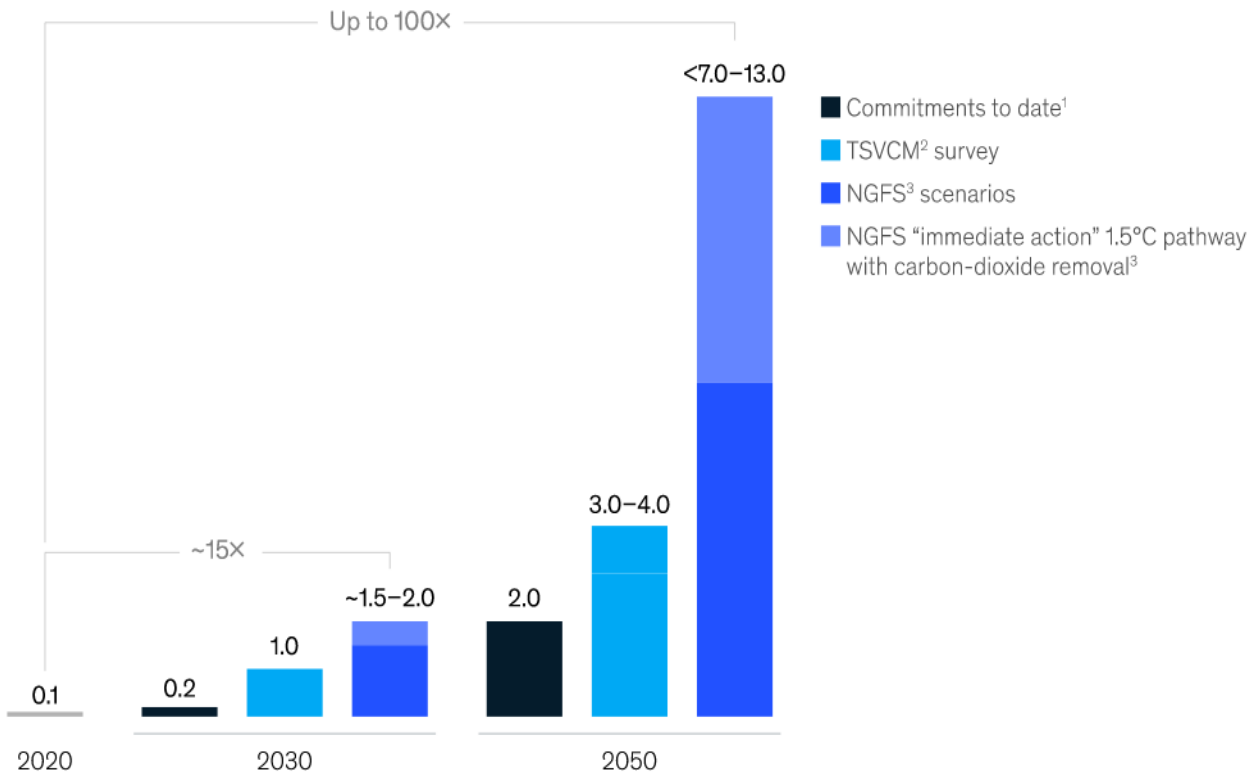
BloombergNEF

# Potential Carbon Credit Demand 2030-2050



Global demand for voluntary carbon credits could increase by a factor of 15 by 2030 and a factor of 100 by 2050.

Voluntary demand scenarios for carbon credits, gigatons per year

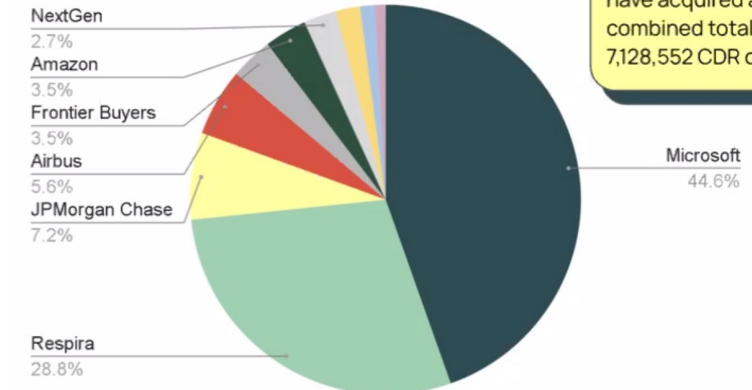


To meet the 2015 Paris Climate Goals:

- Companies need to buy “1.5 to 2.0 gigatons of carbon dioxide (GtCO<sub>2</sub>) by 2030”
- Market in 2023 USD 103.8 billion, and is set to grow at a CAGR of 14.8% from 2024 to 2032.
- 36% of the S&P 500 buy carbon credits (Tech companies, Oil & gas, Fast-moving consumer goods, airlines, Financial).

Top 10 companies for CDR purchases (delivered or awaiting delivered) via cdr.fyi

Last updated February 2024

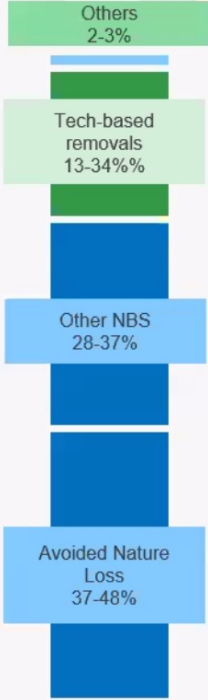


These 10 purchasers have acquired a combined total of 7,128,552 CDR credits.

# Potential Annual Carbon Credit Supply by 2030



## Potential Annual Carbon Credit Supply by 2030 (GtCO<sub>2</sub>e)



Much of the future tech solutions will also come from Asia (Methane capture, biochar, new tech)

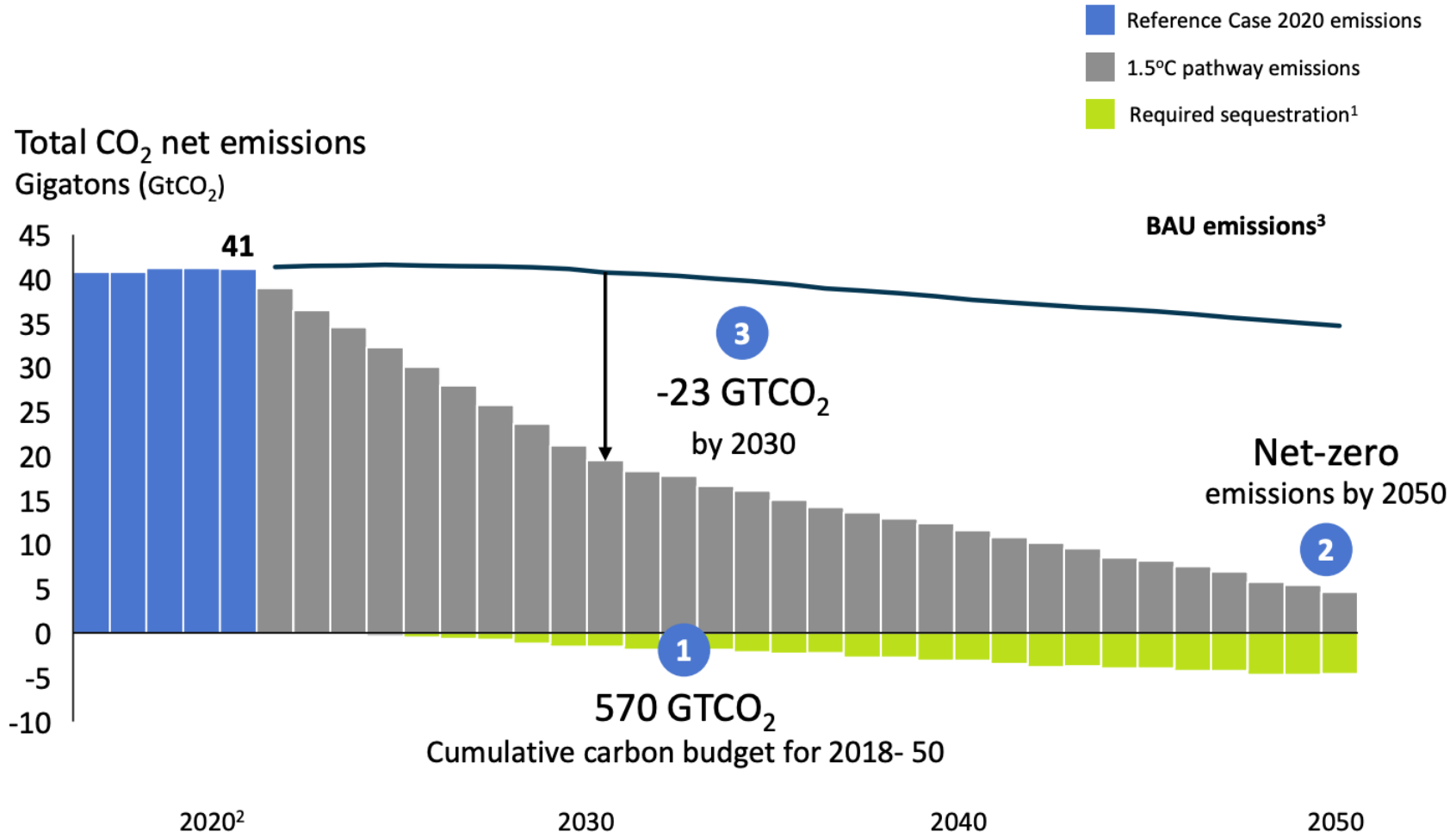
By 2030, natural-climate solutions (NCS) could account for **65-85%** of global supply. Rice Production has much potential.

Share of cost-effective NbS supply potential





# Carbon emissions reduction needed by 2050



- 1 In order to reach the **1.5°C** goal we must remain within the **570 GtCO<sub>2</sub>** carbon budget
- 2 By 2050 **all remaining emissions need to be fully offset** by sequestration (net zero)
- 3 To set us on this path we must reduce net emissions by **23 GtCO<sub>2</sub>** by 2030

# ¿Who we are?



RAC is a registered international NGO headquartered in Mexico and consists of an interdisciplinary team of professionals





RAC implements nature-based solutions and innovative blue carbon initiatives as the Blue Ocean Credits Program




# Blue Ocean Credits Program (BOCP)



 RAC through the BOCP develops holistic, resilient, scalable, long-term sustainable strategies to conserve blue carbon ecosystems' high social, environmental, and economic value for the well-being of present and future generations

 Project 2022-2023: Mesoamerican coastal decarbonization efforts: An innovative, integral, and ecosystem approach

 Project 2023-2024: Blue Ocean Credits Program: Accelerating the Coastal Decarbonization Efforts in the Mesoamerican Reef System

 Both projects are funded by the Net Zero Research Fund, Climate Change Center of Excellence of Scotiabank, Canada

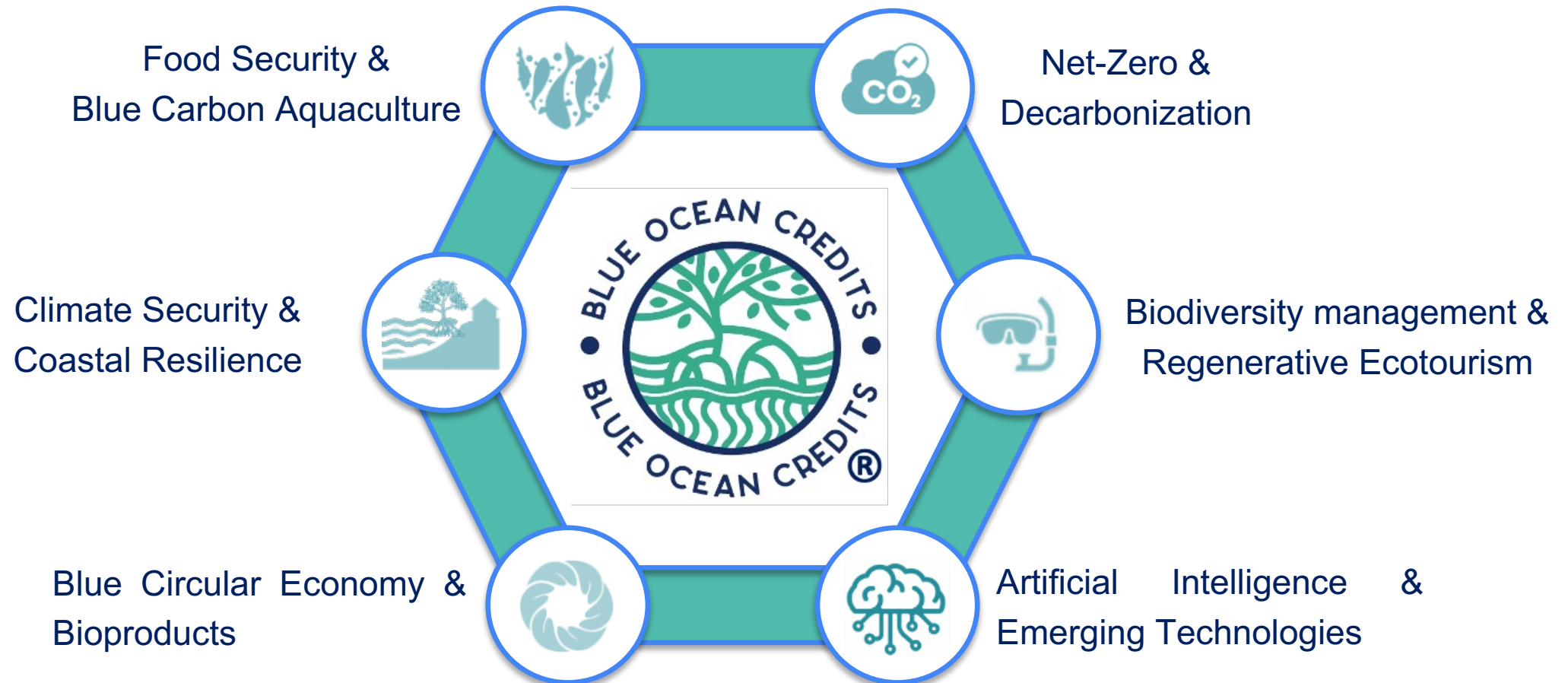


# Scotiabank®

# Strategic BOCP focus



Strategic focus areas to achieve the long-term implementation of blue nature-based business solutions in coastal areas



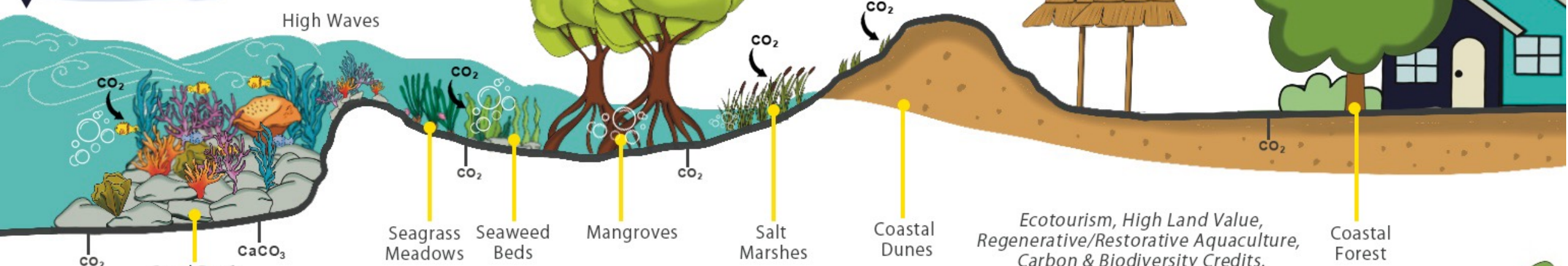


# BOCP: Nature-Positive Economy



**CARBON CAPTURE & STORAGE, HIGH BIODIVERSITY, COASTAL PROTECTION & RESILIENCE  
CLIMATE & FOOD SECURITY, DISASTER RISK REDUCTION, SUSTAINABLE LIVELIHOODS.**

**NATURE-POSITIVE ECONOMY**



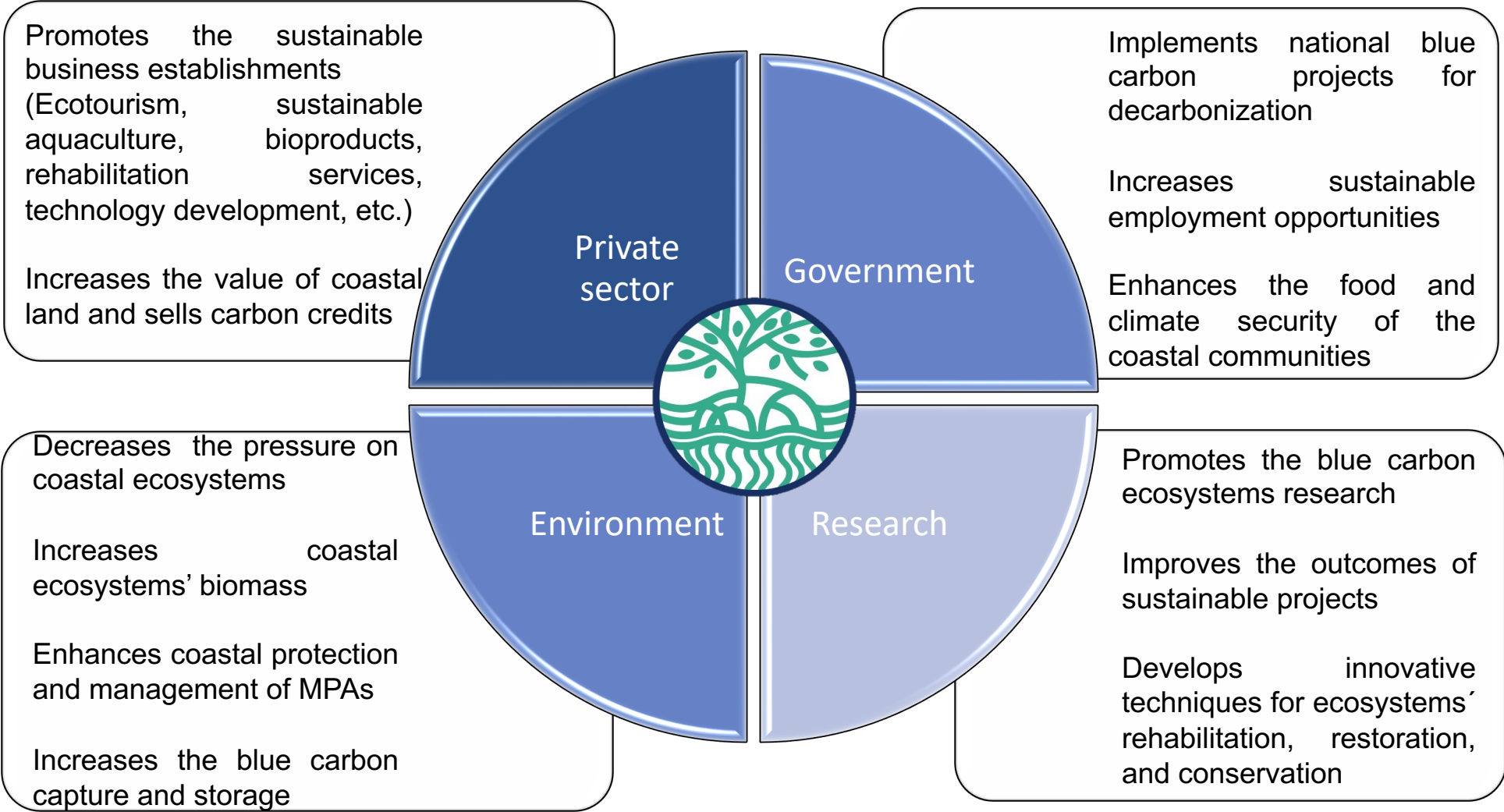
*Ecotourism, High Land Value,  
Regenerative/Restorative Aquaculture,  
Carbon & Biodiversity Credits.*

**NATURE-NEGATIVE ECONOMY**



**CO<sub>2</sub> Release, Floodings, Sea Level Rise, Coastal Erosion,  
Typhoons Impact, Wave and Wind Impact, High Economic/Biodiversity Losses & Disaster Risk.**

# BOCP: Circular Blue Carbon Economy



# BOCP: Nature-based solutions are the future of sustainable business



¡The most efficient economic model is Nature!



If businesses prioritize nature can generate:

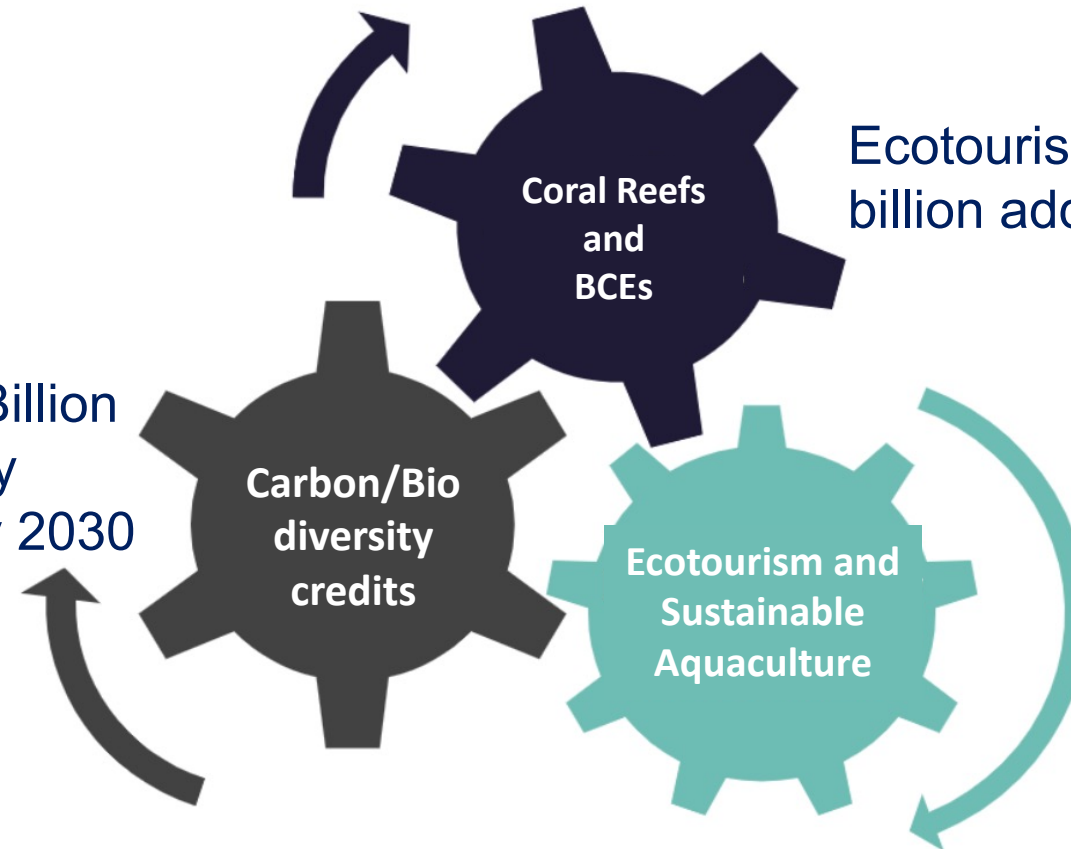


USD 10.1 trillion in new business opportunities



395 million of new sustainable jobs

Carbon  
USD 250 Billion  
Biodiversity  
2 Billion by 2030



Ecotourism USD 290 billion additional/year

Sustainable Aquaculture USD 115 billion additional/year



ET= USD 300 billions (2019) SA= USD 250 billions (2020) CC=978.56 billions (2022)



# International BOCP Traction



SEEDCORE



RED SYCAMORE




AGUNG aquatic marine



# Innovations: Net-Zero AragoReef



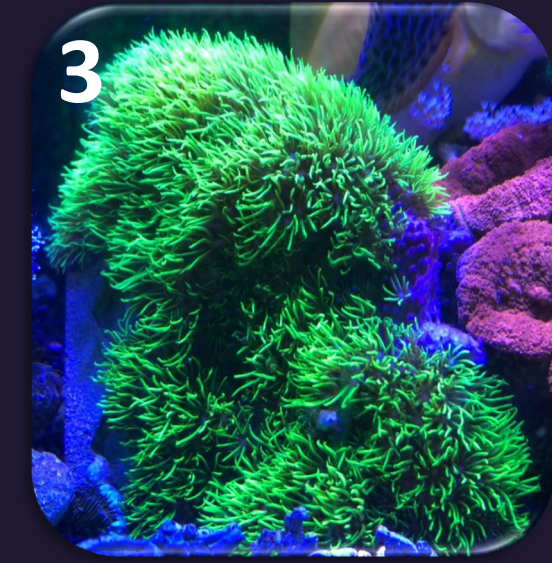
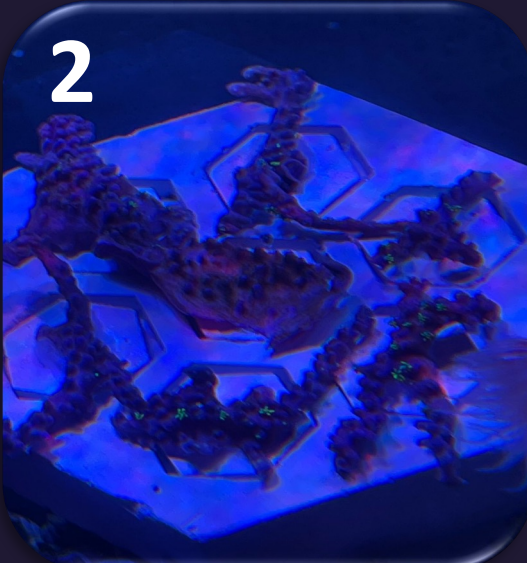
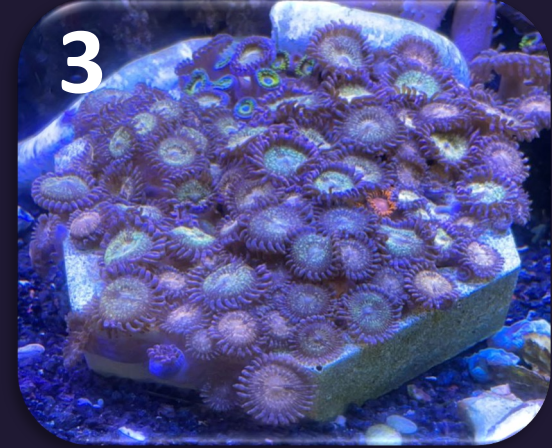
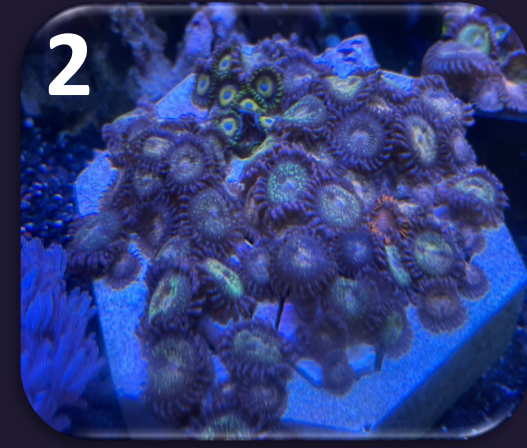
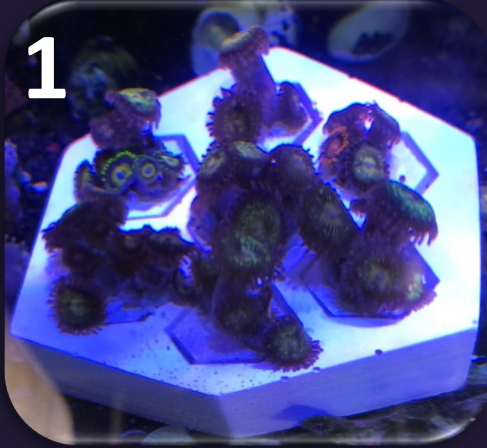
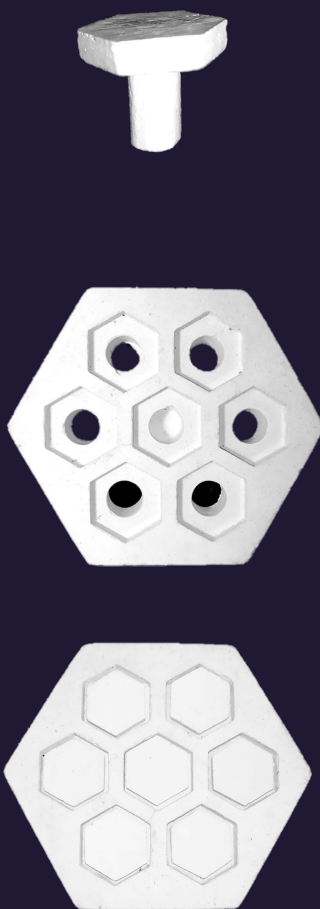
 Exclusive sustainable formulation with natural characteristics

 High content of porous aragonite, versatile, aesthetic, durable, pH buffering action

 Marine life fully colonizes the AragoReef structures after 3 months



# Net-Zero CoralHive propagation system





# Hard and soft corals on the Net-Zero CoralHive





# Scientific validation of AragoReef in the Mesoamerican Reef System and Mexican Pacific



Scientific validation of AragoReef as a marine bio-substrate

Mexican (Zihuatanejo) vs Pacific (Puerto Morelos) Caribbean





# Coral Aquaculture in the Mesoamerican Reef System





Developed hexagonal plugs and port plugs of AragoReef for coral micro-fragmentation (*Diploria spp.*, *Pseudodiploria spp.*, *Orbicella spp.*)



# Net-Zero Intelligent Multi-Trophic AragoReef System (Net-Zero iMTARS)



 3-Dimensional habitats (Crustaceans, Mollusks, Algae, Corals, Seagrass, etc.)

 Modular and scalable systems (Multiple configurations)

 AragoReef 3D design and printing technology






# Net-Zero iMTARS in El Meco-Cancun



 Deployment and monitoring of the iMTARS in "El Meco"

 Ecotourism and blue carbon projects on corals and seagrasses





# BIOARMONIA in El Meco-Cancun



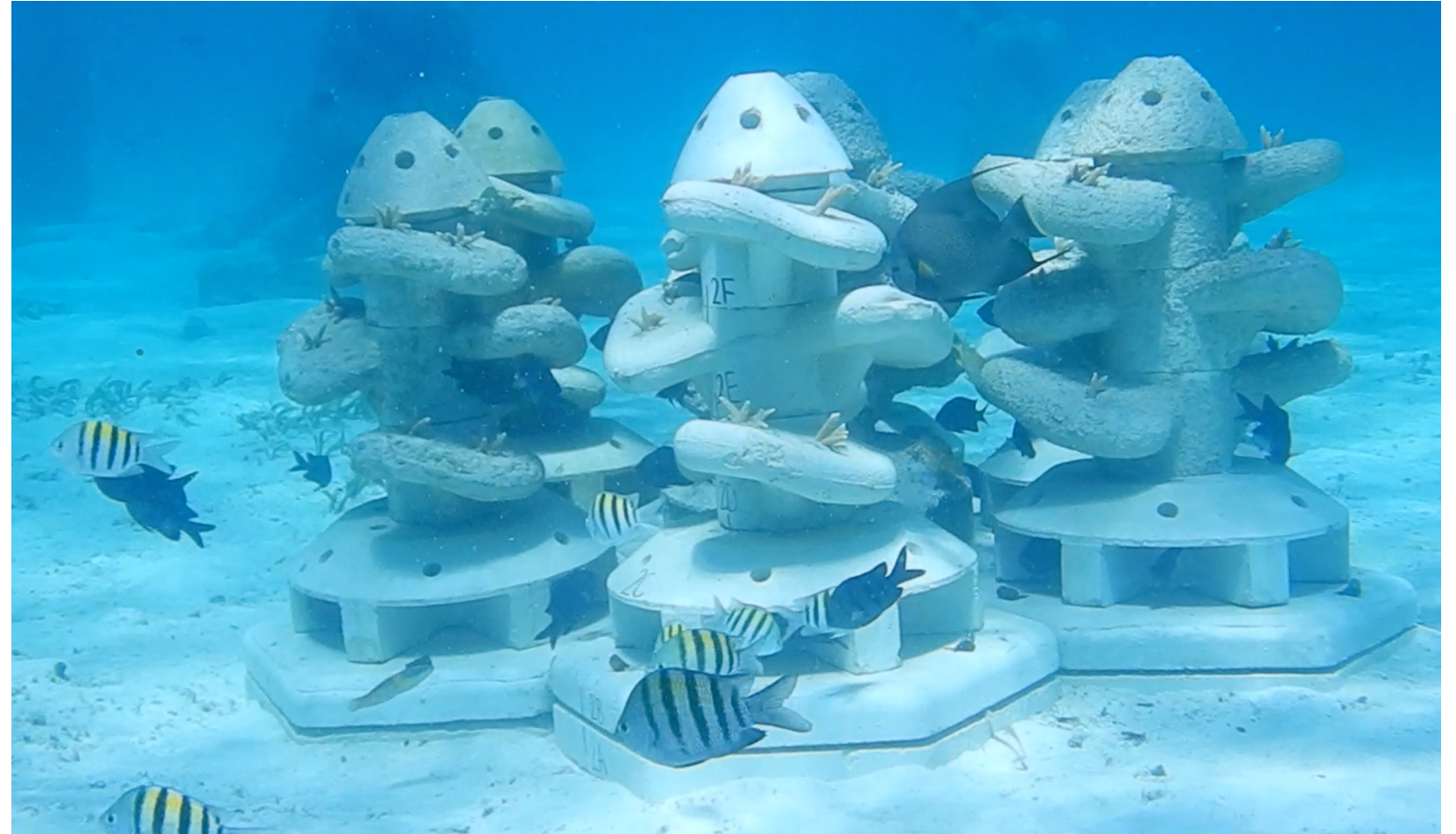
3 BIOARMONIA  
modules (21 Net-Zero  
iMTARS)



254 aquacultured  
staghorn coral colonies  
(*Acropora cervicornis*)



12 aquacultured  
boulder star coral  
colonies (*Orbicella*  
*spp.*)





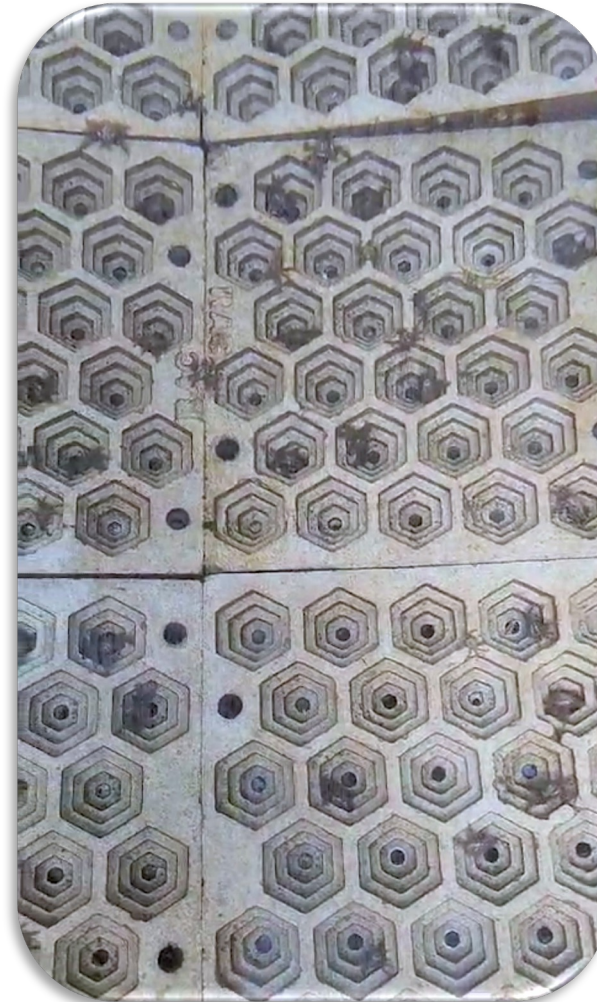
# Corals against white spot syndrome (WSS)



Developed AragoReef structures to reintroduction of the massive corals affected by the WSS (*Diploria spp.*, *Pseudodiploria spp.*, y *Orbicella spp.*)



# Hervivorous spiny crab aquaculture



Developed structures to enhance the culture of spiny crab (*Mithrax spinosissimus*)





# Coral gardening and seagrass rehabilitation



mayakoba™  
mexico



BACABES DEL MAR  
Servicios profesionales

Coral gardens designed and deployed (*Acropora palmata*, *A. cervicornis*, *A. prolifera*) and seagrass bed rehabilitation (*Thalassia testudinum*, *Halodule wrightii*) for conservation/ecotourism activities





# Sustainable production of biochar from sargassum seaweed



Developed an innovative and energy-efficient furnace to produce pelletized biochar





# Sustainable production of biofertilizers and alternative proteins from sargassum seaweed



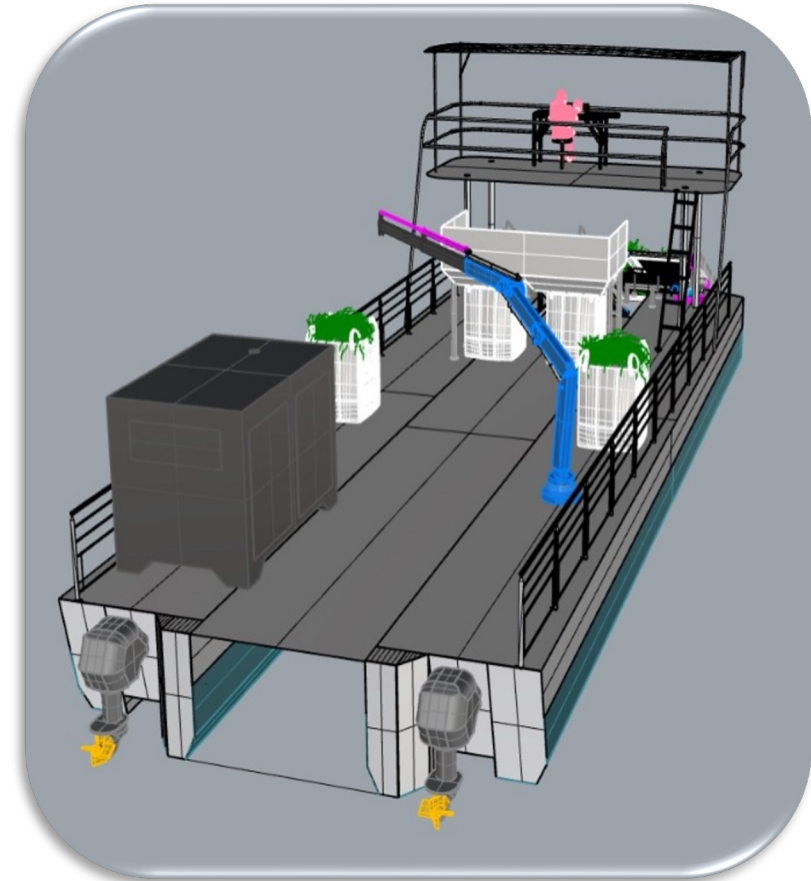
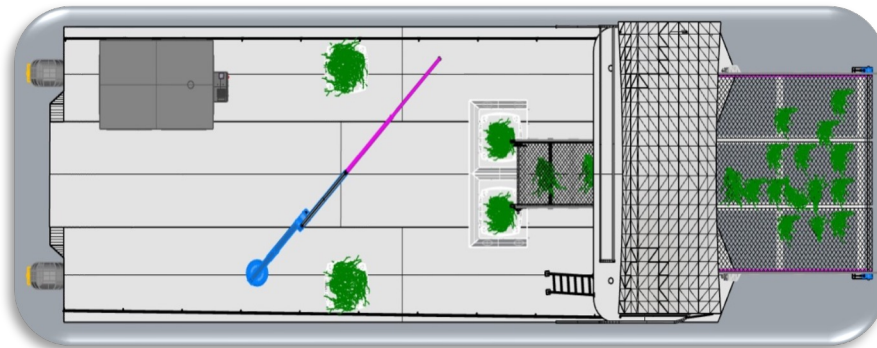
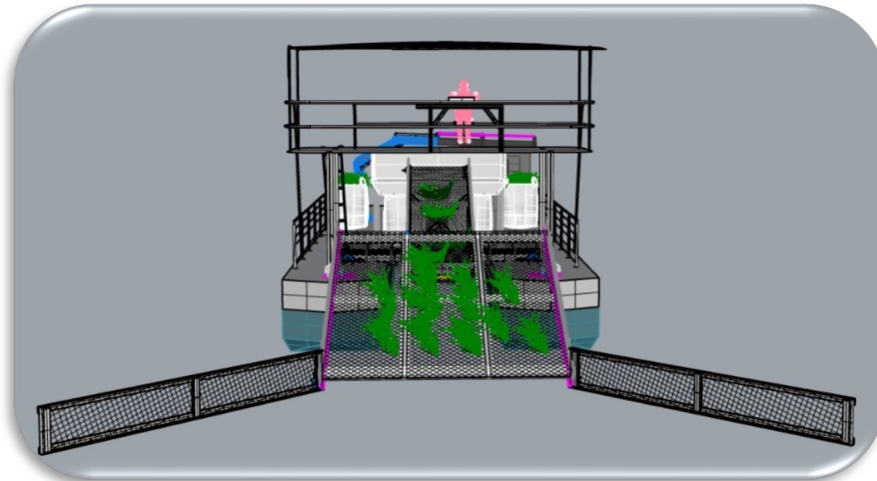
Implemented an integral management system to produce biofertilizers and alternative proteins (Black Soldier Fly and California Red Worms)



# Vessel collector design for sargassum seaweed



Designed of a cost-efficient sargassum vessel collector for the Caribbean waters





# A healthy planet relies on a healthy ocean

## Contact

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President

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Whatsapp. (+521)4431904435

Web: [www.reefac.org](http://www.reefac.org)

