

Blue economy for ocean health and sustainable development



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The benefit of oceans

The sovereign territory of most countries in Latin America and the Caribbean (LAC) includes extensive marine areas, with 60% of the region's population living in coastal provinces or states. These marine zones not only provide employment for millions of people but also contribute immense natural and cultural wealth, along with significant climate-related benefits.¹

LAC is considered a marine biodiversity hotspot due to the vast variety of species inhabiting its oceans. The region is home to 18% of the world's ecoregions,^a more than any other region globally. In the Galápagos National Park, for instance, 20% of marine species, 80% of birds, and 97% of reptiles and mammals are endemic.² The region also boasts large expanses of mangroves and coral reefs.^b The Mesoamerican Barrier Reef System, the second largest in the world, stretches more than 1,000 kilometers along the eastern Pacific coast, hosting over 60 types of corals and 500 fish species.³ Coral reefs support a vast diversity of species and serve as critical habitats for marine organisms such as fish, invertebrates, and algae. This biodiversity is vital to the overall health of oceans, aiding nutrient cycling and providing breeding grounds for many commercially and nutritionally important fish species.

In addition to being a source of employment for millions of people, LAC's marine territory represents enormous natural and cultural wealth, providing a variety of climatic benefits.

Beyond biological wealth, the region's marine and coastal ecosystems provide three key benefits. First, they play a vital role in mitigating climate change due to their capacity for climate regulation. These ecosystems produce roughly half the oxygen we breathe and have absorbed more than 90% of excess heat and about a quarter of CO₂ emissions generated by human

a An ecomarine region is a clearly delineated area in the ocean characterized by a distinct and relatively homogeneous composition of species and ecological conditions, which sets it apart from neighboring regions.

b Refer to the [RED 2023](#) (Global Challenges, Regional Solutions: Latin America and the Caribbean in the Face of the Climate and Biodiversity Crisis) for a detailed discussion on the presence of mangroves and coral reefs in LAC.

activity since 1980.⁴ Specifically, the mangroves, seagrasses, and marshlands in LAC serve as critical carbon sinks.⁵ Additionally, the region's wetlands purify water, maintain the hydrological balance needed to prevent flooding, and provide habitats for a wide range of birds, fish, and invertebrates.⁶



Second, they contribute to climate change adaptation measures. The coral reefs and mangroves in the region—which represent 10% to 12% of the world's coral reefs and mangroves, respectively—help reduce coastal flooding.⁷ The region's mangroves are estimated to prevent around USD 12 billion annually in flood-related losses and protect nearly one million people.⁸

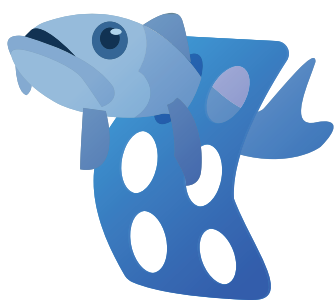


Third, the region's marine and coastal wealth generates significant economic benefits, attracting tourism and supplying resources for industries like fishing. The ocean's economic contribution to the region—estimated at approximately USD 19 billion, excluding tourism and extractive activities—extends beyond these sectors. It is also essential for transporting people and goods, fish processing, pharmaceutical and genetic research, and the oil industry. For instance, maritime freight, which accounts for 90% of global trade, generates nearly USD 5 billion annually in added value for LAC, while passenger transport contributes almost USD 4 billion.⁹ Ocean dependence is particularly acute in the Caribbean, where economies heavily rely on tourism, freight transport, and oil and gas production.⁵ In 2023, over 30 million tourists visited the Caribbean, generating revenue equivalent to 30% of these countries' GDP.¹⁰

Ocean degradation

For years, the undeniable economic potential of oceans has brought substantial benefits to the region. However, the exploitation of LAC's marine resources has resulted in significant degradation of their natural wealth, compromising their ability to deliver climatic, economic, cultural, and recreational benefits in the medium and long term. According to the Ocean Health Index, LAC's oceans are sustainably providing only 73% of the ecosystem services and benefits they could potentially offer based on their characteristics.¹¹ The region faces a critical challenge: to continue leveraging the economic benefits of the oceans while safeguarding their health and biodiversity for future generations.

For the region, the challenge lies in harnessing the economic benefits of the oceans while safeguarding their health and biodiversity over time.



Addressing this challenge requires confronting a wide range of complex issues involving various stakeholders and necessitating coordination to tackle problems that threaten the livelihoods of millions of people. These issues include climate change, coastal development, pollution, invasive species, and overfishing. First, ocean temperatures are expected to increase at higher rates throughout the 21st century, along with more frequent and intense heatwaves and extreme weather events, like *El Niño* and *La Niña*. Furthermore, the absorption of greenhouse gases will continue to accelerate ocean acidification and likely further reduce oxygen levels in marine waters.¹²



Second, land-use changes associated with urban development and economic activities are another major source of degradation, as they involve deforestation and land clearing, which destroy natural habitats. One of the primary causes of mangrove loss is deforestation in coastal areas.¹³ Additionally, the growing size of coastal populations, combined with agricultural activities, has led to greater volumes of untreated wastewater being discharged into the sea—85% of wastewater enters the Caribbean Sea untreated.⁵ Urbanization processes and economic activities in coastal and inland areas also generate large amounts of plastic waste, which is dumped into the ocean, disrupting fish movement and survival.

Third, ship traffic generates noise and light pollution, which facilitates the introduction of invasive species through ballast water. These species prey on marine flora and fauna, intensify competition for food with other animals, and contribute to the spread of diseases among marine ecosystems.⁹ Invasive species are one of the most significant drivers of ecosystem disruption in LAC¹⁴ and are regarded as the primary cause of biodiversity loss in island ecosystems.¹⁵ It is estimated that 80% of the world's archipelagos are invaded by rodents.¹⁶ Several marine industries, including desalination plants, salt production facilities, aquaculture, and shipping, also bear the consequences of invasive species.¹⁷

Lastly, overfishing represents a major threat to the ocean, being the leading driver of marine vertebrate extinction.¹⁸ In the Caribbean specifically, overfishing causes substantial harm to coral reefs.⁵

Issues such as climate change, coastal development, pollution, invasive species, and overfishing have modified the structure and functioning of LAC's oceans and coasts in different ways.

Manifestations of ocean degradation

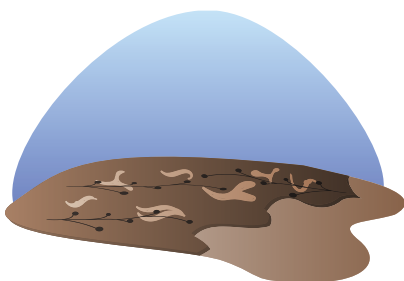
These problems have modified the conditions of the structure and functioning of LAC's oceans and coasts in different ways.

Increased water temperatures and nutrient pollution caused by contamination have led to phenomena such as coral bleaching. While corals can recover naturally, their regeneration is so slow that it cannot offset the damage already incurred—coral populations have declined by half over the past 150 years. For example, the Mesoamerican Barrier Reef has eroded by 37% due to acidification.⁸ It is estimated that a global temperature increase of 1.5°C could result in the extinction of 90% of coral populations, which would threaten food supplies, coastal protection, and tourism.¹²

The high exposure of coastal areas in the region to rising sea levels and extreme weather events endangers lives, environment, and economies. Caribbean nations, in particular, face recurring costs related to disaster protection and post-event reconstruction due to their geographic location and small size. These challenges strain their fiscal health—not only because of the magnitude of expenditures and required borrowing but also due to their increased vulnerability, which drives up the cost of financing.⁸



Other adverse effects of climate change and pollution include the loss of mangroves and sargassum inundations. Since 1980, it is estimated that 20% of the world's mangroves have disappeared,⁹ while 40% of mangrove species in the Atlantic and Central Pacific regions are now at risk of extinction.¹⁹



Sargassum inundations refer to the massive, often sudden arrival of these algae along coastlines, where they accumulate in large quantities. The Caribbean and Gulf of Mexico, with their extensive coastlines, have been particularly affected by these events, which have grown in both frequency and intensity over the past decade. Dense mats of algae block sunlight, hindering photosynthesis in critical habitats such as seagrasses, mangroves, and coral reefs. This can lead to oxygen depletion (hypoxia), the formation of coastal "dead zones,"^c and the buildup of hydrogen sulfide, a toxic gas that poses health risks

^c Zones in the oceans where life is unsustainable for any species due to low oxygen levels.

Sargassum inundation refers to the massive and often sudden arrival of these algae on the coasts, where they accumulate in large quantities.

to humans and coastal ecosystems.²⁰ Excessive sargassum accumulation near shorelines also disrupts fishing, tourism, and the health of coastal communities.¹² Between 2016 and 2019, sargassum inundations in Quintana Roo, Mexico, resulted in an estimated 17.5% reduction in local economic activity and an 11.6% decline in the state's monthly economic growth.²¹

The decline in fish populations is another visible consequence of ocean degradation. According to the Food and Agriculture Organization of the United Nations, fish catches in LAC have decreased due to

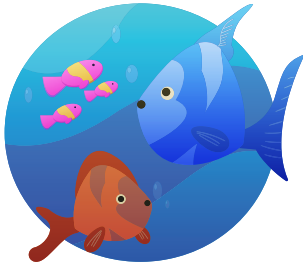


overfishing, ocean acidification, reduced oxygen levels, and invasive species.¹² One in four species of cartilaginous fish, such as sharks and rays, is now threatened with extinction.²² Illegal, unregulated, and unreported fishing (IUU) alone is estimated to cause annual losses of approximately USD 2.3 billion in the region, affecting both family and government incomes.²³

The global economic impact of deteriorating ocean health could reach 0.3% of current global GDP by 2050, potentially rising to 1.8% by 2100¹⁸ if no additional measures are taken. These estimates do not account for cultural losses. Despite the vital role oceans play in sustaining life and economic activity, and the growing interest in preserving their integrity, the region faces significant challenges in managing its marine and coastal resources and ensuring their sustainable use.

Nonetheless, efforts to understand and quantify the value of the oceans are gaining momentum in the region. More importantly, progress is being made in implementing the regulatory, planning, coordination, and execution measures needed to ensure that the people of Latin America and the Caribbean can fully benefit from the opportunities provided by their coasts and seas.

CAF's action



CAF has provided support to promote the blue economy in LAC, a concept that encompasses the protection of the health of coasts and marine water bodies while promoting the sustainability of economic activities that depend on them. CAF's initiatives emphasize marine and coastal ecosystem restoration, blue carbon,^d renewable marine energy, and sustainable fishing and aquaculture.

In June 2022, CAF announced a direct investment of USD 1.25 billion to support the protection and sustainable development of maritime and coastal zones in LAC from 2022 to 2026. This strategic initiative is anchored in the **"CAF Blue Commitments Decalogue,"** developed in 2023, which outlines the following commitments:

- » Forge connections with global entities dedicated to ocean conservation and sustainability.
- » Accelerate progress on Sustainable Development Goal (SDG) 14, "Life Below Water," in LAC.
- » Incorporate blue-green components into all guidelines and operations.
- » Fast-track the fulfillment of the Global Biodiversity Framework's goals and targets.
- » Cultivate a dynamic portfolio of projects related to the ocean and the sustainable blue economy.
- » Expedite the design of projects focused on the sustainable use of marine and coastal areas.
- » Support Sustainable Ocean Plans within the framework of the "Ocean Action 2030" coalition.
- » Advocate for Americas Declaration for the Ocean.
- » Join the Global Fund for Coral Reefs.

^d It refers to carbon flows in marine ecosystems that can be managed for climate change mitigation ([Brassiolo et al., 2023](#)).

Since 2021, CAF has approved USD 862 million in 14 credit operations and 16 technical cooperation projects with components related to sustainable blue economy initiatives and the protection of marine and coastal areas. Additionally, it has mobilized resources from the Global Environment Facility (GEF) in 4 projects and from the Adaptation Fund in one project, reaching USD 90 million.



Beyond direct project support, CAF's participation in various forums over recent years has helped amplify the region's voice and advance a concrete agenda on protecting marine and coastal areas and promoting a sustainable blue economy. These efforts have focused on mobilizing greater financial resources for the region, facilitating the exchange of knowledge and capacity-building, and fostering a shared vision to address challenges and explore potential solutions.

CAF has participated in at least ten conferences or events, including the United Nations Ocean Conference (UNOC), the United Nations Environment Programme, the G20 Marine Ecosystem Adaptation Working Group, and the "Ocean Action 2030" Coalition.

Most of the action in these areas has focused on supporting initiatives to strengthen public policies related to marine and coastal zone management in the design, planning and monitoring phases.



In 2022, CAF also launched the BIOCAF initiative, designed to catalyze change in partner countries by fostering the valuation, conservation, restoration, and sustainable use of biodiversity to ensure a sustainable supply of ecosystem services. This initiative is structured around five key components, one of which focuses on biodiversity, the blue economy, and ocean health.



CAF-supported projects, delivered through credit operations and technical cooperation, have reached at least 16 countries, addressing a broad range of issues. A significant portion of this support has centered on strengthening public policies for managing marine and coastal zones, particularly in the areas of design, planning, and monitoring. CAF has funded diagnostics on challenges such as illegal fishing and value chain development, reviewed international experiences to identify best practices, crafted strategic proposals, regulations, and action plans, and reinforced monitoring and evaluation efforts for the implementation of various initiatives. Additionally, CAF has played a role in advancing public policy discussions by producing analytical reports aimed at promoting sustainable trade policies and conserving marine and coastal biodiversity, for example.²⁴

In the implementation phase, CAF has provided direct funding for sanitation and climate adaptation projects in coastal areas, supported pilot programs for artisanal fishing commercialization practices and the eradication of invasive species. It also accompanied the implementation of specific actions in marine protected areas, sustainable bio-business programs, and sargassum-based enterprises.

In terms of capacity-building, some operations have included the documentation of lessons learned, the exchange of experiences, and direct capacity transfer. CAF has emphasized the effective management of knowledge and information as a means of producing and disseminating lessons about the implementation of supported projects. It has also fostered research on issues such as sargassum and coral restoration.

In addition to direct project financing, CAF has sought to mobilize additional financial resources for marine and coastal issues in the region by supporting the development of innovative financial instruments and capacity-building efforts.

Specific initiatives include designing and issuing a Blue Bond^e; structuring debt-for-nature swaps for Ecuador's Eight-Mile Marine Corridor; implementing marine biodiversity credits in Chile's Patagonia; establishing a sustainable financing fund for the Eastern Tropical Pacific Marine Corridor (CMAR); and designing a financial product for artisanal fishers in Ecuador. CAF has also supported efforts to develop financial instruments and strengthen the technical and institutional capacities of the Ecuadorian government to raise funds for conserving the Blue Corridor.

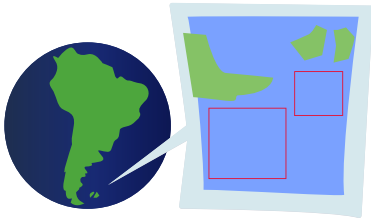
CAF's initiatives contribute to achieving SDG 14, which focuses on conserving and sustainably using oceans, seas, and marine resources. Other SDGs aligned with CAF's actions include poverty reduction (SDG 1), zero hunger (SDG 2), sustainable sanitation (SDG 6), climate action (SDG 13), and the protection of terrestrial ecosystems (SDG 15).



^e A blue bond is a debt instrument that functions similarly to a traditional bond, with the key difference being that the issuer commits to using the funds raised to finance conservation and protection activities or sustainable economic activities based on marine ecosystems.

Areas of intervention supported by CAF and their impact

Marine protected areas (MPA)



Marine protected areas (MPAs) are geographically defined spaces designated to conserve marine ecosystems and their ecosystem services. As a subset of protected natural areas, MPAs are among the most effective global strategies for *in situ* ecosystem preservation, addressing biodiversity loss and climate change with the urgency these challenges demand.^f

Since 2021, CAF has supported the establishment and management of MPAs through 5 operations in Brazil, Costa Rica, Chile, Colombia, Ecuador, Panama, Uruguay, and the Greater Caribbean, benefiting approximately 1.5 million square kilometers—equivalent to more than half the size of the Caribbean Sea. These projects have focused on both the initial phases of MPA implementation and the management of existing MPAs.



CAF'S ACTION IN THE LAST 4 YEARS (2021-2024)

5 operations

related to Marine Protected Areas (MPAs)

8 countries supported

Brazil, Costa Rica, Chile, Colombia, Ecuador, Panama, Uruguay and the Greater Caribbean

+1.5 million km² benefited

Two of these operations were highlighted in [ImpactoCAF – Natural protected areas](#): one in Ecuador to establish effective protection for the Galápagos Islands and another to strengthen the Eastern Tropical Pacific Marine Corridor (CMAR), which spans Costa Rica, Colombia, Ecuador, and Panama.

In Brazil, Uruguay, and the Caribbean, resources have been allocated to mapping and analyzing available data to identify priority marine and coastal areas for MPA designation. Efforts

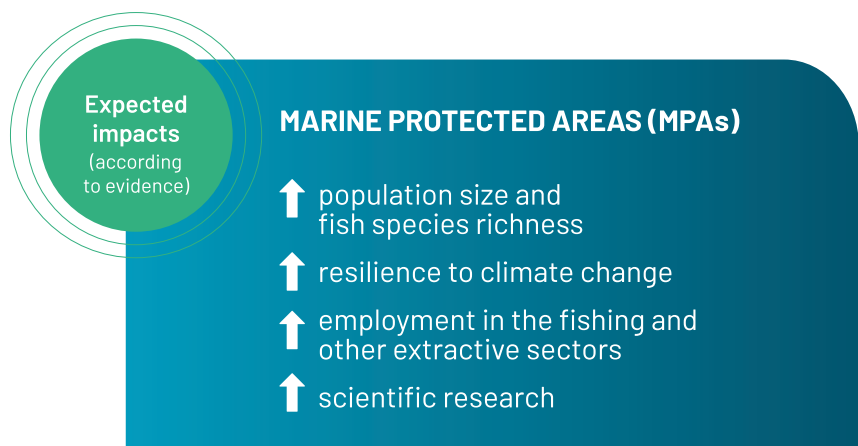
^f The document [ImpactoCAF – Natural protected areas](#) provides a detailed discussion of protected area policies and their potential impacts.

also include designing MPAs with ecological continuity and directly creating MPAs in pre-identified priority zones. In Uruguay, CAF supported the development of a roadmap to create a national MPA network and implement other nature-based conservation measures.



Recognizing the growing importance of effective MPA management, CAF has allocated resources in 5 operations to enhance management, monitoring, and enforcement capacities. These efforts have involved developing training materials, producing technical documents, facilitating cross-country coordination, drafting operational plans, and financing the operational activities of MPAs.

CAF's support for the establishment and management of MPAs is expected to increase fish populations and species diversity,¹⁵ particularly endangered species.²⁵ It is also expected to boost resilience to climate change because by protecting ecosystems such as mangroves, seagrasses, salt marshes, coral reefs, marine sediments, and coralline algae from human activity also preserves their capacity to store carbon²⁶. These ecosystems prevent the release of carbon stored in marine sediments, which would otherwise convert back to CO₂ and exacerbate ocean acidification. Protecting just 3.6% of the ocean, particularly within exclusive economic zones (EEZ),^g could eliminate 90% of the current risk of carbon stock mobilization.²⁵



^g Exclusive Economic Zones (EEZs) are areas extending 200 nautical miles from the territorial sea baseline of any country, over which the country has jurisdiction and special rights for the exploitation of natural resources found in the seabed, subsoil, and overlying waters.

Other potential benefits of MPAs include:

- » protecting jobs in the fishing sector over the medium and long term;
- » generating new employment opportunities in non-extractive industries such as tourism and recreational activities;
- » fostering conflict resolution among stakeholders;
- » preserving habitats and fish populations to support artisanal and recreational fisheries;
- » supporting scientific research
- » creating non-commercial value through the



appreciation of natural beauty and connection to marine life;

» increasing awareness of biodiversity conservation; and, lastly,

» showcasing the possibility of simultaneously achieving environmental and economic sustainability—for instance, ensuring the long-term viability of fisheries while preserving biodiversity.²⁷



Sustainable fisheries management

Globally, the share of fishing conducted at unsustainable levels has risen from 10% in 1974 to 38% in 2021,²⁸ driven by insufficient oversight and regulation of legal fishing as well as illegal fishing practices. In the Southeast Pacific, for instance, 66% of fishing occurs at unsustainable levels.

CAF has supported three projects totaling USD 17 million that entail concrete actions to reduce illegal, unregulated, and unreported (IUU) fishing and promote sustainable fishing practices in the region.



CAF ACTION OVER THE LAST 4 YEARS (2021-2024)

3 projects

that include concrete actions to reduce IUU fishing and to promote sustainable fisheries

\$17 million dollars

In Ecuador, CAF approved technical cooperation to diagnose IUU fishing issues and identify response strategies. Additionally, to encourage more sustainable fishing practices, CAF supported a pilot project connecting artisanal fishers with end customers and designed financial products to help small-scale fishers upgrade their boats and fishing equipment.

CAF has also approved two operations to manage GEF resources in the Caribbean and Ecuador. The first project focuses on promoting the blue economy in the Caribbean Large Marine Ecosystem Plus,^h by advancing ecosystem-based fisheries and sustainable seafood value chains. The second supports the effective conservation of protected areas in the Galápagos Islands, including strengthening capacity for detecting and managing illegal fishing. Specifically, the Galápagos project aims to support four actions:

1. Renewal of surveillance fleets.
2. Basic training for surveillance personnel and the implementation of standard operating protocols.
3. Improvement of equipment and data management systems.
4. Training for lawyers and park rangers from the Galápagos National Park Directorate.



There is limited rigorous evidence on effective strategies to combat illegal fishing, partly due to the difficulty of quantifying the issue. However, there is some consensus, supported by quantitative analyses, on priority measures to reduce the incidence of IUU fishing, several of which CAF has supported through credit or technical assistance operations.

Countries with robust monitoring and enforcement systems or greater surveillance capacities are less likely to experience significant IUU fishing issues.

Countries with robust monitoring and enforcement systems or greater surveillance capacities are less likely to experience significant IUU fishing issues.²⁹ Moreover, aggressive strategies aimed at increasing the costs associated with illegal fishing have demonstrated some degree of success.^{30,i}

Although there is limited rigorous evidence on the effectiveness of strategies promoting sustainable fishing, it is well understood that overexploitation of marine resources often results from smaller fisheries striving to increase their incomes. Protecting marine life is thought to require reducing incentives for illegal

^h Barbados, Belize, Guyana, Jamaica, Panama, and Saint Lucia.

ⁱ According to studies conducted in countries facing illegal fishing like Indonesia and Liberia (Cabral et al., 2018 and Sherif, 2019).

fishing while encouraging the adoption of sustainable practices by lowering the barriers to their implementation. Some of the CAF-supported initiatives mentioned earlier, such as improving the market access and commercialization of artisanal fisheries' products, as well as providing better access to financing and training programs, are designed to address these challenges while fostering sustainable livelihoods.

Expected impacts
(according to evidence)

CONTROL OF ILLEGAL FISHING

- ↓ illegal fishing
- ↑ sustainable fishing practices
- ↑ recovery of fish stocks



Prevention and management of invasive species and species translocation

CAF, with funding from the Global Environment Facility (GEF), has supported two projects totaling USD 10.5 million to prevent and eradicate invasive species in the Galápagos Islands (Ecuador) and Cocos Island (Costa Rica).



CAF ACTION IN THE LAST 4 YEARS (2021-2024)

2 projects

to prevent and eradicate invasive species in the Galapagos Islands (Ecuador) and Cocos Island (Costa Rica)

\$10.5 million
dollars

In the Galápagos, funds were allocated to implementing biosecurity measures to prevent the reintroduction and reproduction of invasive species. The initiative also financed the eradication of black rats (*Rattus rattus*), mice (*Mus musculus*), and cats (*Felis catus*), which negatively affect terrestrial and marine biodiversity by reducing fish biomass, damaging coral health, diminishing mangrove effectiveness, and contaminating waters with diseases such as toxoplasmosis. In Costa Rica,

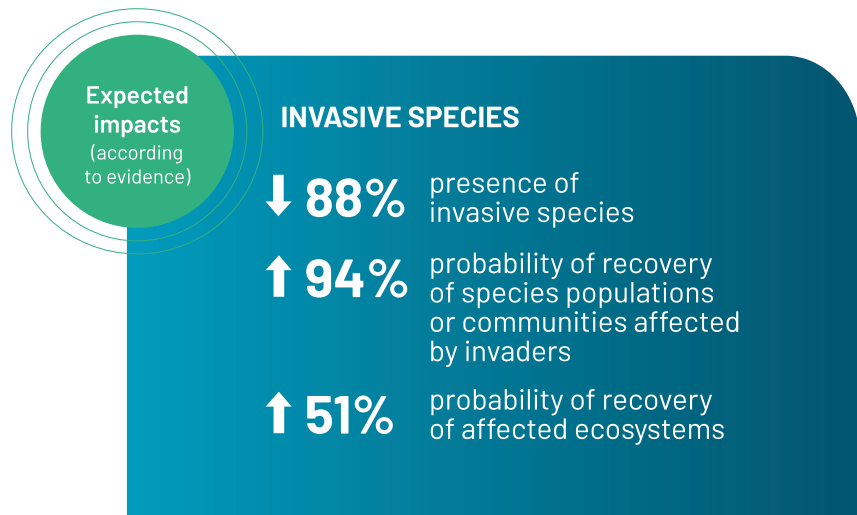
support was provided for developing biosecurity protocols as part of a prevention system for invasive species. Preparatory eradication activities were also funded, including capacity-building efforts, field trials, operational planning, and socio-environmental impact assessments.

Preventive measures, such as biosecurity controls, appear to be the most cost-effective strategy to reduce the impacts of invasive species.

Regarding the effectiveness of invasive species prevention and eradication, experts agree that an effective management strategy begins with identifying high-risk species, their potential origins, and an estimate of the magnitude of the threat they pose.³¹ In the next phase, if effective prevention methods are available for the identified invasive species, these should be implemented to avoid the higher costs associated with an invasion. Preventive measures, such as biosecurity controls, are considered the most cost-effective strategy to mitigate the impacts of invasive species. While prevention may involve significant initial costs, the benefits are substantial, as it helps avert both the environmental damage caused by these species and the economic costs associated with their control or eradication.³² Although rigorous studies on the effectiveness of prevention strategies are scarce, some analyses support their use. For instance, a European study found that countries with weaker border controls had more established populations of invasive species.³³ The prevention measures implemented on Cocos Island are consistent with this approach.

In general, conservation actions, such as species eradication, improve the state of biodiversity or, at the very least, slow down its deterioration.

If invasive species are already present, it is crucial to assess the extent of the damage they cause to determine whether monitoring or full eradication is the most appropriate course of action. Evidence shows that eradication efforts, like those supported by CAF, succeed in eliminating invasive species in 88% of cases.³⁴ Furthermore, there is a 94% likelihood of recovery for populations or communities affected by invasive species³⁵ and a 51% probability of recovery (partial or complete) for impacted ecosystems.³¹ Overall, such conservation initiatives enhance biodiversity conditions or, at the very least, slow its decline.³⁶



Similarly, in 2024, CAF assumed management of a GEF-funded project totaling USD 15.8 million to restore the ecological integrity of the Galápagos Islands through the translocation of extinct or endangered species, specifically five populations of birds and snakes. After addressing predatory invasive species, the next crucial step is the recovery of affected species, which is vital for the full restoration of the ecosystem. Available evidence suggests that initiatives like this have a 50% likelihood of success.^{37,j} However, previous species translocation efforts in the Galápagos,³⁸ combined with invasive species eradication initiatives, provide encouraging prospects for the successful relocation of bird and snake populations within the framework of this project.



Coral restoration

As previously mentioned, preserving and restoring coral reefs is critical for maintaining marine biodiversity and ensuring the socioeconomic well-being of human populations that rely on these ecosystems.³⁹

CAF has supported a coral restoration initiative in the Caribbean (Colombia, Mexico, and Costa Rica) and the Pacific (Ecuador) with USD 125 thousand in funding. The project aims to strengthen existing restoration efforts, launch pilot programs using sexual restoration methods,^k and foster greater regional cooperation and resource mobilization for reef restoration. When effectively implemented, this initiative has a significant

^j One measure of success is the growth rate of translocated species populations.

^k Sexual reproduction in corals occurs when female and male polyps release gametes into the water, which combine; or when male polyps release gametes that fertilize female polyps. Fertilization results in the formation of a cell called a planula larva, which floats through the water until eventually settling on the seafloor to form a new coral colony ([Oceanographic Institute – Albert I Foundation, Prince of Monaco](#)).

potential to recover degraded corals and enhance the health of surrounding ecosystems. The use of sexual methods may be pivotal in achieving better long-term outcomes.



CAF ACTION OVER THE LAST 4 YEARS (2021-2024)

1 coral restoration operation

in the Caribbean (Colombia, Mexico and Costa Rica) and the Pacific (Ecuador)

\$125 thousand dollars

Active coral rehabilitation efforts have generally proven in supporting the recovery of degraded corals populations.

Active coral rehabilitation efforts have generally proven effective in supporting the recovery of degraded coral populations.⁴⁰ Reviewed studies show an average survival rate of approximately 60% for restored corals.⁴¹ In the case of sexual restoration methods, research conducted in the Caribbean reported survival rates between 28% and 83%, with greater success observed when growth farms were established directly in the coral's natural environment.⁴²

Given projections of rising global temperatures and their impact on coral survival, restoration efforts must focus not only on replenishing coral populations but also on selecting species that are more resilient to climate change and certain diseases. One significant advantage of sexual restoration methods is their ability to increase the genetic diversity of coral, thereby improving their capacity to adapt to changing ocean conditions. Moreover, these methods can help reduce costs and minimize collateral damage when implemented on a larger scale.⁴³

Coral restoration ideally contributes to broader improvements in marine ecosystems. A study evaluating four long-term rehabilitation programs found that while restored areas exhibit greater structural complexity compared to non-restored sites, genetic richness does not show substantial changes.

It is important to emphasize that failing to address the root causes of coral degradation remains one of the main limitations of restoration efforts. Without addressing these underlying factors, corals will continue to deteriorate for the same reasons that initially necessitated restoration.⁴⁴

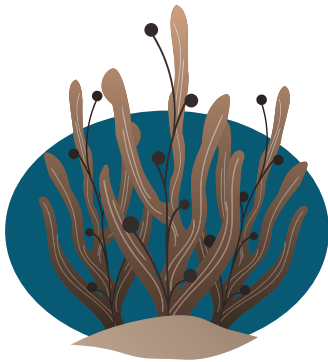


For this reason, coral restoration should be accompanied by complementary measures such as carbon sequestration, coastal protection, and the restoration of other ecosystems like mangroves and seagrass meadows.^{44,1}

Expected impacts
(according to evidence)

CORAL RESTORATION

- ↑ probability of survival with sexual restoration methods (**between 28 and 83%**)
- ↑ probability of coral adaptation to climate change when sexual methods are used
- ↑ structural complexity of corals



Comprehensive sargassum management

Addressing the challenges posed by sargassum inundations requires a multifaceted approach that combines short-term management with the implementation of long-term mitigation strategies. In the short term, the most common response involves physically removing sargassum from beaches and nearby coastal waters. In the long term, it is crucial to tackle the anthropogenic drivers of the issue, including ocean warming, agricultural runoff, and the discharge of untreated wastewater into the sea.

There is a growing interest in finding sustainable uses for sargassum to support its management while also generating economic opportunities for local communities. However, developing sargassum-based products faces several challenges:

1. Uncertainty about the timing and scale of sargassum inundations and its chemical composition, which may include harmful substances that pose risks to human health.
2. Logistical difficulties in harvesting, transporting, and storing the algae.
3. The lack of regulations and governance frameworks governing its use.
4. Insufficient funding for research and development to foster innovation.⁴⁵

Addressing the challenges posed by sargassum inundations requires a multifaceted approach that combines short-term management with the implementation of long-term mitigation strategies.

¹ Some experts even believe that providing a stable substrate for larval settlement, along with actions to reduce stress factors, is more important than restoration itself (Omori, 2019).



CAF'S ACTION IN THE LAST 4 YEARS (2021-2024)

1 operation

to promote integrated sargassum management in the Greater Caribbean

\$150 thousand dollars

CAF is supporting a project with USD 150 thousand in funding to promote comprehensive sargassum management in the Greater Caribbean^m and is also developing another initiative slated to begin in 2025. These projects target key areas of sargassum management as its influxes grow more frequent across the region. Their goals include advancing research to diagnose the issue, pinpoint its causes and impacts, and identify the most vulnerable areas. Additionally, they seek to improve funding mechanisms for projects focused on the sustainable use of sargassum and to foster enhanced cooperation and knowledge exchange among countries on strategies for managing sargassum inundations.



INTEGRATED MANAGEMENT OF SARGASSUM

- ↑ response capacity of affected areas to sargassum inundation
- ↓ economic losses

^m This particularly includes Barbados, Colombia, Costa Rica, Jamaica, Mexico, the Dominican Republic, Trinidad and Tobago, and Venezuela.



An estimated 45 million people live within 10 kilometers of the coast in LAC, representing approximately 7% of the region's population in just 3% of its total territory.

Sanitation and waste management

An estimated 45 million people live within 10 kilometers of the coast in LAC, representing approximately 7% of the region's population in just 3% of its total territory. In the Caribbean, coastal areas are even more densely populated, with 12% of the population residing in low-lying coastal zones, which account for about 20% of the territory. Coastal populations and their associated economic activities generate significant negative externalities for marine and coastal ecosystems. The primary pollutants affecting the ocean in the region include marine and coastal debris, untreated or partially treated wastewater, and agricultural runoff carried by river systems to the ocean. Industrial pollutants, heavy metals, and waste from maritime activities also negatively impact the environment, although their presence is less well-documented in the region.⁴⁶

Pollution and improper waste disposal increase the presence of toxic substances, harming both marine species and coastal human populations. These communities not only risk direct contact with these toxins but may also consume contaminated food.

CAF has financed numerous sanitation projects across the region.⁴⁷ Among these are 5 ongoing credit operations totaling USD 140 million in coastal areas of Brazil, Colombia, Ecuador, and El Salvador, and another project under development in Ecuador.

These initiatives, which benefit approximately 2.4 million people, focus primarily on constructing wastewater treatment plants, improving collection networks, installing household connections, and building pumping stations. CAF has also funded pre-investment activities for 5 sanitation projects in Ecuador, Panama, Peru, and Chile. In Colombia and Ecuador, CAF has supported 2 operations to develop integrated waste management models aimed at reducing waste generation, enhancing waste handling, and ensuring sustainable disposal to mitigate impacts on marine ecosystems.





CAF'S ACTION IN THE LAST 4 YEARS (2021-2024)

13

sanitation and waste management operations

↳ **7 credit operations**

↳ **6 technical operations**

\$325.8 million dollars

2.6 million people benefited

Evidence documented in [ImpactoCAF - Water and sanitation](#) indicates that access to sanitation services, such as those provided by CAF, can halve the incidence of gastrointestinal and respiratory illnesses, particularly among children. Although direct evidence of the impact on marine ecosystems remains scarce, it is reasonable to expect improvements in ecosystem health by reducing the discharge of untreated wastewater into the ocean—one of the leading sources of marine pollution.



SANITATION AND WASTE MANAGEMENT

↓ discharge of contaminated water and plastics into the sea.

↑ health of the oceans

↑ health of human populations

Flood Prevention



Recent estimates suggest that rising sea levels under an intermediate global emissions scenario could displace 1.46% of the global population and result in a 0.19% present value loss in global GDP by the year 2200, with coastal communities facing the most severe impacts. The Caribbean, in particular, has experienced significant consequences from extreme climatic events due to its geographic location and the relatively small size of its economies.⁸



CAF'S ACTION IN THE LAST 4 YEARS (2021-2024)

5 operations

to reduce the risk of flooding in Brazil and Trinidad and Tobago

\$172 million dollars

at least

910 thousand beneficiaries

To reduce flood risk in coastal areas, CAF has approved five operations in Brazil and Trinidad and Tobago. Two of these projects, representing an investment of USD 120 million, are already underway, while the other three are expected to begin soon. The ongoing initiatives focus on stormwater drainage and macro-drainage of water bodies, benefiting an estimated 140,000 people. While rigorous studies on flood prevention and protection measures are limited, projections indicate that such interventions could generate significant cost savings. Protective measures in urban areas meeting current standards could reduce flood-related damages by approximately 91%.⁴⁸



FLOOD PREVENTION

↓ **91%**

of damages generated by flooding (under current protection standards)



Driving sustainable economic activities

The viability and growth potential of economic activities based on marine and coastal ecosystems largely depend on the availability of adequate public infrastructure and services. CAF has financed operations totaling USD 354 million, directly supporting these economic activities and benefiting coastal populations.



CAF'S ACTION OVER THE LAST 4 YEARS (2021-2024)

\$354 million
dollars

to benefit economic activities and populations
living in coastal areas

↳ **\$200** million
dollars

to reinforce electricity distribution networks
in the aquaculture sector

\$150 million
dollars

to improve mobility and the integration
of coastal areas

\$3.8 million
dollars

to strengthen supply processes in
the Galapagos Islands

In Ecuador, CAF is financing the reinforcement of electricity distribution networks for the aquaculture sector through a USD 200 million loan. Evidence presented in [ImpactoCAF – Sustainable electrification](#) suggests that improved access to the electrical grid in the aquaculture sector could increase production and worker productivity. This, in turn, may enhance the sector's economic sustainability by supporting job creation and raising incomes for the populations that depend on it.

CAF has also financed two technical cooperation initiatives in Ecuador, totaling USD 3.8 million, to strengthen supply processes in the Galápagos Islands.

In the area of road infrastructure and ground transportation, CAF has provided USD 150 million in financing to Brazil to enhance mobility and integrate coastal territories. Improving intra- and inter-urban connectivity can reduce travel times and costs, facilitating access to labor markets, goods, and services. As greater access drives economic activity, it has the potential to boost employment, production, and exports, with positive effects on poverty and inequality levels.⁴⁹



Expected impacts
(according to evidence)

SUSTAINABLE ECONOMIC ACTIVITY

- ↑ economic sustainability of the aquaculture sector
- ↓ costs and travel times
- ↑ economic activity in coastal areas

In summary

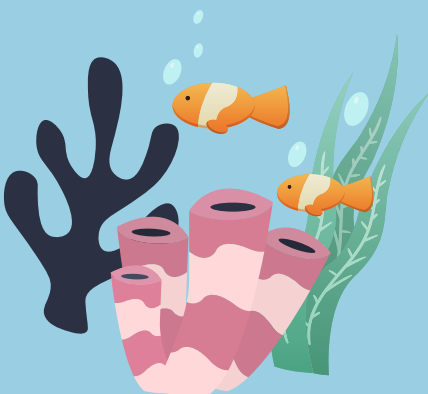
The ocean plays a critical role in LAC as a fundamental source of employment and food, housing unique marine biodiversity, regulating the climate, and supporting climate change adaptation efforts. However, climate change, coastal development, pollution, invasive species, and overfishing are degrading these ecosystems, threatening biodiversity, and jeopardizing the economic benefits they generate.

In response, CAF has financed and mobilized USD 952 million to support projects aimed at preserving ocean health and promoting a sustainable blue economy. These actions focus on strengthening ocean and coastal policies through planning, monitoring, and project execution.

CAF has also supported the development of innovative financial mechanisms, such as blue bonds and trusts, to allocate more resources to marine conservation. Additionally, the bank has fostered regional coordination to jointly manage large marine ecosystems and address shared environmental challenges.

CAF's actions have the potential to generate significant impacts across various areas of intervention:

- » The creation and management of Marine Protected Areas (MPAs) could increase the size and diversity of fish populations while improving climate resilience by safeguarding carbon storage capacities.
- » Preventing and eradicating invasive species in the Galápagos Islands and Isla del Coco, combined with species translocation efforts, could successfully restore affected species populations and ecosystems.
- » Supporting surveillance systems for monitoring, detecting, and controlling illegal, unreported, and unregulated (IUU) fishing in Ecuador, Costa Rica, and the Caribbean will be essential for reducing the overexploitation of marine resources.
- » Coral rehabilitation in Colombia, Costa Rica, Ecuador, and Mexico could not only restore degraded reefs but also strengthen their ability to adapt to climate change.
- » Achieving integrated sargassum management in the Caribbean Sea and the Gulf of Mexico is key to enhancing the response capacities of affected areas and preventing economic losses.



» Expanding access to sanitation services in coastal cities in Brazil and Colombia and improving solid waste management will help reduce the discharge of polluted water and plastics into the ocean.

» Flood prevention infrastructure could mitigate the human and material costs of flooding.

» Investments in electrical, logistical, and road infrastructure in coastal areas have the potential to boost productivity in marine and coastal resource-based economic activities.

All these efforts aim to preserve biodiversity, contribute to climate change mitigation and adaptation, and ensure that future generations can continue to benefit from marine resources while maintaining the economic sustainability of the region's coastal communities.



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- 40 [Rinkevich \(2014\)](#)
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- 45 [Oxenford et al. \(2021\)](#)
- 46 [Diez et al. \(2019\)](#) and [Landrigan et al. \(2020\)](#)
- 47 [ImpactoCAF - Water and sanitation](#)
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- 49 [ImpactoCAF - Roads](#) and [ImpactoCAF - Urban mobility](#)