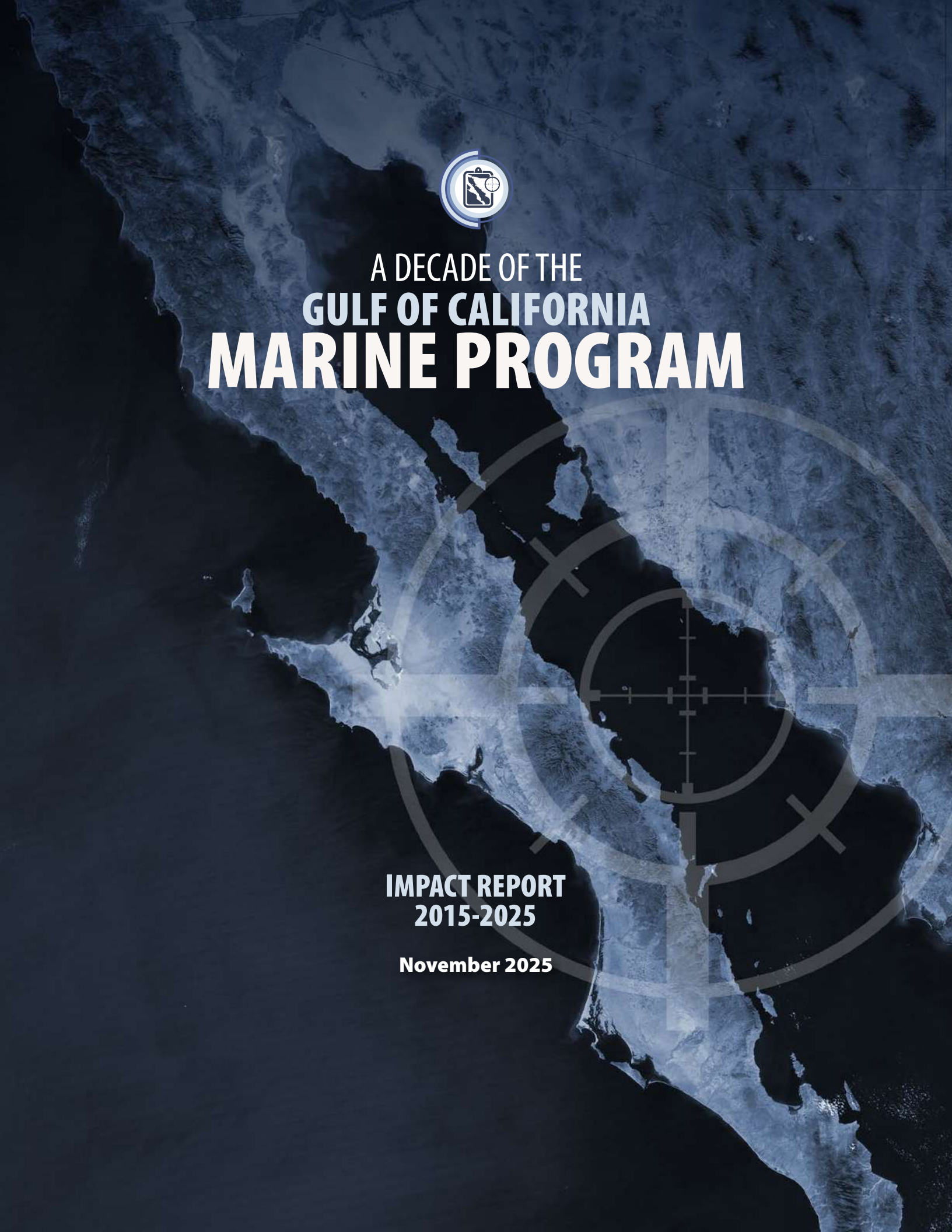

A DECADE OF THE GULF OF CALIFORNIA MARINE PROGRAM

IMPACT REPORT 2015-2025

November 2025

Message from Gulf of California Marine Program Director

Over the past decade, the Gulf of California Marine Program (GCMP) has demonstrated that effective marine conservation in Mexico is achieved through the convergence of science, community, and collaboration. From its origins as a research initiative at Scripps Institution of Oceanography to its evolution under the Institute of the Americas, the GCMP has grown into a bridge between rigorous ecological science and the realities faced by coastal communities.

Through long-term monitoring of reefs, mangroves, and fisheries, our team has provided essential data to evaluate marine protected areas, advance blue carbon accounting, and guide national policy. Yet, beyond numbers and publications, our greatest impact has been building trust —training young scientists, partnering with fishers, and nurturing local stewardship that endures beyond any single project. In this report, we look back at a decade defined by innovation: the creation of open-access platforms like dataMares and science communication initiatives likes Mares Mexicanos, the development of transformative tools such as chatMPA, and the design of forward-thinking frameworks like Marine Prosperity Areas (MPpAs) that align ecological recovery with economic opportunity. **These efforts illustrate a clear vision —one where conservation, prosperity, and knowledge flow together across borders and generations.**

As we enter our next chapter, the GCMP remains committed to collaboration as the foundation for impact. We will continue to integrate cutting-edge science with local experience, expand our partnerships across Mexico and beyond, and inspire the next generation of ocean leaders. **The challenges ahead —from climate change to biodiversity loss— demand not only scientific insight, but shared purpose. The story of our first ten years is proof that when science is inclusive, accessible, and human- centered, it can transform both ecosystems and communities. The decade to come will build on that promise.**

Catalina López-Sagastegui
Director GCMP, 2017-2025

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Our Mission

To inspire sustainable coastal and ocean policy and management to integrate science into decision-making in Mexico.

Our Vision

For decision-makers to take an ecosystem-based approach to managing Mexico's coasts and oceans, leading to prosperous coastal communities and healthy ecosystems for future generations.

Partners

The Institute of the Americas (IOA) has promoted sound public policy and fostered cooperation between public and private sector stakeholders across the hemisphere for over 40 years. In an effort to expand its programmatic work focused on marine and coastal policy issues related to Mexico, the IOA integrated the GCMP as an integral part of its Environment program in 2021.

Scripps Institution of Oceanography (SIO) at UC San Diego was founded in 1903. It works to understand and protect the planet and find solutions to our most pressing environmental challenges. The GCMP was first started by Dr. Octavio Aburto as a research program at SIO in 2008. It continues to be an initiative affiliated with the Center for Marine Biodiversity and Conservation.

The Centro de Biodiversidad Marina y Conservación (CBMC) was founded in 2012 to support Mexican researchers as they develop research projects and allow young people to continue their scientific training. The center supports GCMP by increasing influence on coastal and marine management in the region.

Dr. Exequiel Ezcurra, an ecologist with over 30 years of experience, professor of ecology at UC Riverside, and adjunct professor at Scripps Institution of Oceanography. His research is highly intertwined with GCMP initiatives and helps to inform the strategic planning.

Science, Communities, and Story telling: A Shared Path to Impact

Over the past decade, the GCMP has advanced a holistic model for marine conservation in Mexico, integrating rigorous scientific research, community-based monitoring and inclusive leadership development. With intensifying pressures from overfishing, habitat degradation, and climate change, the GCMP has positioned itself at the intersection of science, policy, and local stewardship.

Anchored in long-term ecological studies, the GCMP has contributed critical data for evaluating marine protected area (MPA) performance, understanding ecosystem change, and informing national policy. Additionally, it has helped catalyze community-led initiatives and pioneered tools such as the Marine Prosperity Areas (MPpAs) framework and the Reef Status Index.

Platforms like dataMares and Mares Mexicanos have become outlets for scientific knowledge, translating complex findings into actionable insights for resource users, scientists, conservation agencies, and the public. This assessment reflects on a decade of impact and reviews GCMP's contributions to conservation outcomes, knowledge production, and the training of a new generation of conservation leaders in Mexico.

The GCMP is built on four interconnected pillars—**academic achievements, scientific diplomacy, community engagement, and science communication**—that form a cycle of impact. Rigorous research provides the foundation for policy influence, which is strengthened by the knowledge and participation of local communities. Storytelling and digital tools bring visibility and support to help spark new questions and collaborations. **At the center are the people —families, youth, and regional partners— who are beneficiaries, co-creators and drivers of conservation.**

Key Research Themes

The GCMP blends interdisciplinary science with community collaboration to support effective marine conservation. By integrating ecology, fisheries science, socioeconomics, and environmental modeling, the program produces open-access research that is often co-created with local fishers and coastal stakeholders.

Backed by the academic strength of the Aburto Lab at Scripps Institution of Oceanography and the Exequiel Ezcurra Lab at UC Riverside, the program has generated critical long-term monitoring data and dozens of peer-reviewed publications that deepen our understanding of ocean health, sustainable fisheries, and the socioeconomic value of coastal ecosystems.

- Mangrove Ecosystem Services & Coastal Protection
- Marine Protected Areas & Conservation Frameworks
- Blue Economy : Ecotourism & Public Engagement
- Biodiversity
- Fisheries

Science For Policy

GCMP's work has supported the protection of Mexico's most iconic marine areas, including Cabo Pulmo, Revillagigedo, Islas Marías, and Tabasco's relict mangrove forests. Through peer-reviewed publications, visual storytelling, and active participation in policy forums, the program has made the case for large-scale marine protections that also address climate resilience and social equity.

Collective learning

The GCMP provides access to high-impact research and data that informs conservation, restoration and co-management initiatives. Partnerships with fellow scientists, government agencies, fishing and tourism groups, students and coastal communities help promote transparency, create capacity and contributes to strengthening evidence-based governance systems.

Global Recognition

Peer-reviewed publications, outreach material and participations in international forums, the GCMP's work is recognized for its rigorousness. In 2025, GCMP's leadership was recognized at the UN Ocean Conference (UNOC3) and during the U.S.-Mexico Forum's session on "Scientific Diplomacy: Building a Gulf of California Alliance."

A Decade of the **GULF OF CALIFORNIA MARINE PROGRAM** **IMPACT** REPORT 2015-2025

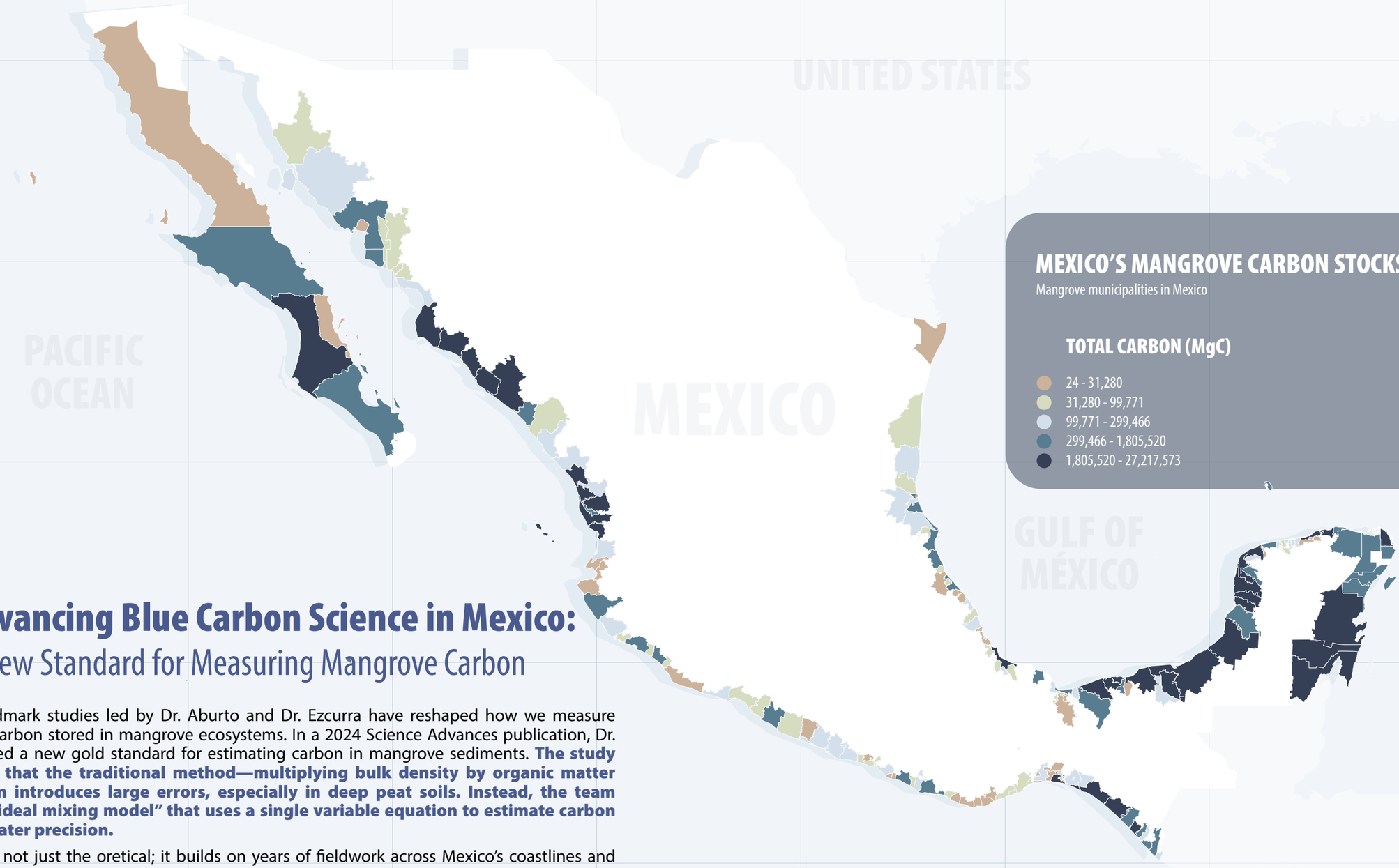
Research highlights

Advancing Blue Carbon Science in Mexico:
A New Standard for Measuring Mangrove Carbon

A series of landmark studies led by Dr. Aburto and Dr. Ezcurra have reshaped how we measure and value the carbon stored in mangrove ecosystems. In a 2024 Science Advances publication, Dr. Ezcurra proposed a new gold standard for estimating carbon in mangrove sediments. **The study demonstrated that the traditional method—multiplying bulk density by organic matter content—often introduces large errors, especially in deep peat soils. Instead, the team validated an "ideal mixing model" that uses a single variable equation to estimate carbon with much greater precision.**

This advance is not just the oretical; it builds on years of fieldwork across Mexico's coastlines and integrates findings from microbial studies, sediment coring trials, carbon mapping, and policy modeling. This body of work strengthens the foundation for rational blue carbon accounting and conservation policy and equips scientists, land managers, and policymakers with accurate tools to quantify the climate value of mangroves.

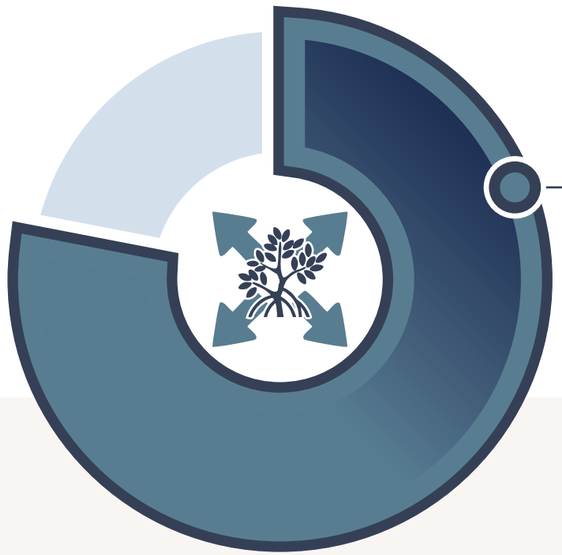
A Decade of the **GULF OF CALIFORNIA MARINE PROGRAM**
IMPACT REPORT 2015-2025



MEXICO'S MANGROVE CARBON STOCKS
Mangrove municipalities in Mexico

TOTAL CARBON (MgC)

- 24 - 31,280
- 31,280 - 99,771
- 99,771 - 299,466
- 299,466 - 1,805,520
- 1,805,520 - 27,217,573



905,086 ha
of mangrove forest in Mexico

77%
of the coverage is in 5 states

40 ha/year
current rate of deforestation

Mangroves eliminate CO_2 from the atmosphere → **10 times** faster than a tropical forest

$25,000-$50,000 dollars
fisheries productivity from 1 ha of fringe mangrove forest

$392 million dollars
in avoided damages over → **25 years**
if mangrove forests are protected and restored in priority areas

A Decade of the **GULF OF CALIFORNIA MARINE PROGRAM**
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Mangrove Restoration Priority Areas

Launched in 2010, the Mangrove Monitoring Program focuses on restoring and conserving coastal wetlands as a nature-based solution to the climate crisis. Led by Octavio Aburto, the initiative combines ecological science, blue carbon research, and science diplomacy to position mangroves as critical ecosystems for biodiversity, fisheries, and coastal protection.

Its flagship effort is a blueprint for an ecological corridor between Nayarit and Sinaloa, integrating restoration, connectivity, and carbon sequestration for climate resilience. **The program works with local communities, Indigenous peoples, government agencies, universities, and global alliances to advance a vision of zero deforestation and 20% of mangrove restoration by 2030.** By blending field science, geospatial technology, economic valuation, and storytelling, the Mangrove Monitoring Program is shaping national policy and global dialogue on blue carbon and coastal resilience.

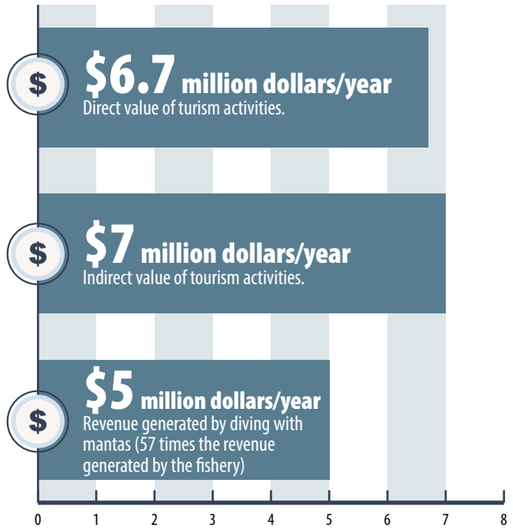
Revillagigedo Archipelago

The GCMP played a lead role in assessing the ecological and economic outcomes of North America's largest no-take area: the Revillagigedo National Park. Using satellite tracking, fishery landings data, and artificial intelligence tools from Skylight (Allen Institute for AI), researchers demonstrated that industrial fishing effort and catch volumes remained stable five years after protection, refuting claims that the park would harm Mexico's fishing economy. This analysis helped validate the effectiveness of fully protected, off shore MPAs for biodiversity and long-term food security. The study, published in Science Advances in 2023, reinforces GCMP's commitment to collaborative, transparent, scalable science that informs both national policy and global marine conservation goals.

TOURISM

1,200 - 1,700
Average number of tourists who visit Revillagigedo in a year.

80
Average number of tourism trips completed between November and May.



FISHING
BEFORE 2017

2%
Percentage of fishing area the park represented for the industry.

$8.5 million dollars/year
Economic contributions from fishing inside the park's boundaries.

16 tons/day
Average fishing catch during a year.

20 tons/day
Average catch during the peak of the finishing season.

AFTER 2017

0%
Percentage of the fleet operating inside the park's boundaries.

16 tons/day
Average catch per unit effort outside the MPA.

A Decade of the **GULF OF CALIFORNIA MARINE PROGRAM** **IMPACT** REPORT 2015-2025

Research timeline

2017
Revillagigedo National Park designated as North America's largest fully protected MPA.

2017 - 2022
Data collected via satellite tracking and vessel monitoring system using AI analysis via Skylight platform.

2019
GCMP data was shared with CONANP and revised management plan was published.

2023
Results of a study published in Science Advances concluded that there was no decline in fishing catches post-designation of MPA.

Normalized Reef Status Index

Understanding trophic structure—biomass distribution across ecosystem levels—is vital for assessing marine energy dynamics and community health. While intact systems often show top-heavy or concave pyramids, human pressures, especially "fishing down" the food web, disrupt these patterns. GCMP members developed the Normalized Reef Status Index (NRSI), a standardized tool to evaluate reef health, and applied it to 346 reefs across the Mexican Pacific. This analysis revealed that only reefs in Fully Protected Areas showed minimal human impact while unprotected reefs showed depleted architectures, lacking apex predators. Such degradation undermines coastal livelihoods, food security, and ecosystem balance. The NRSI offers a scalable approach for monitoring and conservation, highlighting urgent action against anthropogenic impacts.

chatMPA

ChatMPA – Marine Protection Assistant is a pioneering initiative launched in 2023 to support the management and governance of Marine Protected Areas. Co-founded by Dr. Octavio Aburto and Dr. Fabio Favoretto, ChatMPA develops a network of specialized chatbots that translate complex scientific data **—ranging from ecological monitoring and vessel tracking to climate models and peer reviewed research—** into practical, multilingual recommendations for managers, communities, and policymakers.

Built on the foundations of dataMares and GCMP's monitoring programs, ChatMPA seeks to democratize access to marine science, foster adaptive management, and strengthen compliance, participation, and conservation outcomes. With projected global reach and initial focus in Mexico and Latin America, the platform represents a paradigm shift from passive data storage to active, collaborative, and intelligent decision-support for the ocean.

A Decade of the GULF OF CALIFORNIA MARINE PROGRAM
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Punta Abreojos

In the coastal community of Punta Abreojos, in Baja California Sur, local fishers are leading the way in community-based science. Through a 12-year partnership with the GCMP, the Fishing Cooperative has contributed detailed fisheries data. This cooperative has sustainably managed their marine resources for over 40 years through self-regulation, no-take zones, and seasonal closures. By connecting community knowledge with formal scientific research, this collaboration exemplifies the power of co-produced science to inform local management and support conservation rooted in place

Community Engagement

The GCMP believes that conservation is strongest when led by those who live alongside marine ecosystems. Through collaborative monitoring programs, fishers and tourism operators collect ecological and economic data, turning daily activities into powerful tools for science. These efforts have grown into a regional network spanning dozens of communities from Baja California to Nayarit. Initiatives like dataMares and Mares Mexicanos make this science accessible through bilingual visuals, interactive maps, and open data to help communities, students, and decision-makers understand and act on environmental challenges in real time. By investing in local knowledge and leadership, GCMP fosters stewardship that lasts, protecting marine life not just through policy, but through people.

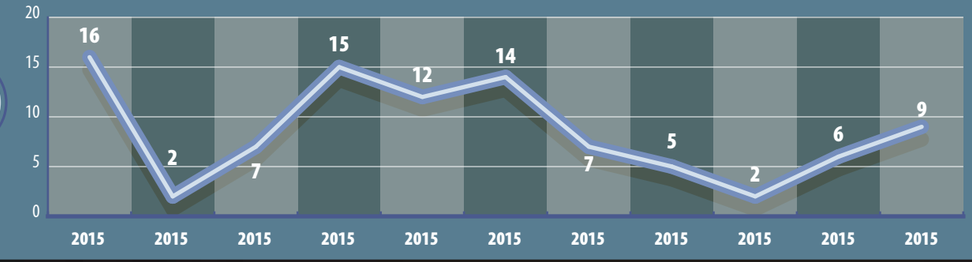
Community Engagement Model:

Collaborative Science
We partner with tourism operators, fishing cooperatives and other community members to generate data on biodiversity, productivity and ecosystem health.

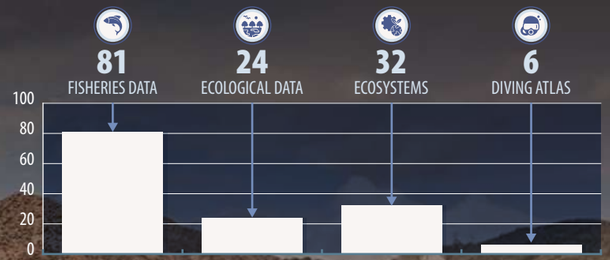
Capacity building
We create opportunities for early-career and/or students to gain hands-on experience in research.

Empowering through technology
We combine new technology with traditional scientific methods and tools to engage local stakeholders and empower them to participate and lead collaborative research projects.

DATA REQUESTS



OPEN-ACCESS DATA
143 DATABASES



TRAINED STUDENTS (2015-2025)

- **7** Undergraduate
- **13** Master's Degree
- **4** PhD
- **2** Postdoc

ROCKY REEF MONITORING
27 YEARS

- **>340** rocky reefs
- **479** species recorded
- **432,553** records in database
- **>15,800** transects
- **100%** accessible data

SCIENCE COMMUNICATION

- **561** videos
- **13** infographics
- **72** posters

Atlas de Buceo

Under the leadership of Dr. Aburto from SIO, Atlas de Buceo gives way to Atlas Aquatica, an initiative co-developed with Revive Our Oceans and UNESCO's Ocean Decade that highlights the ecological, cultural and economic value of dive sites in Mexico through scientific research, community involvement and conservation strategies. **It utilizes ecological data generated by GCMP and diving activity data to empower coastal communities to protect, restore and conserve marine and coastal ecosystems.**

Contributed to the global economy annually by scuba diving industry

$8.50 billion

$20.4 billion

Direct spending on diving activities annually

$900 million

$3.2 billion

124,000
Jobs supported across 170 contries

80%
Of Divin-Industry jobs are held by local of national residents

70%
Of all dives occur in Marine Protected Areas

Science Communication & Storytelling

The GCMP has harnessed a science communication strategy that merges research with compelling storytelling, aiming to bring marine conservation into the public arena through accessible, visually engaging content. By leveraging modern media, including documentary filmmaking, photography, interactive web platforms, and social media, the GCMP has expanded the reach and resonance of its science far beyond academic audiences. Core to this strategy are dataMares and Mares Mexicanos, platforms that translate complex ecological data into stories, infographics, and visual narratives tailored for policymakers, educators, coastal communities, and the public. Central to this approach is the use of photography and video, particularly the under water imagery of Dr. Octavio Aburto, whose visual work humanizes marine issues, evokes emotional connection, and elevates the voices of coastal communities. These tools not only build public awareness but also make science comprehensible and actionable for decision-makers.

dataMares

dataMares is GCMP's open access data platform and its preferred repository for transparent, vetted information on marine ecosystems, fisheries, and coastal communities. Since its launch in 2013, it has made millions of data points on fisheries, rocky reef health, mangrove ecology, and climate change impacts publicly available.

Beyond access to information, dataMares actively builds capacity through trainings, fosters collaboration across institutions, and develops science communication outputs to continue promoting marine conservation.

Mares Mexicanos: Storytelling for Ocean Conservation

Mares Mexicanos is a storytelling-driven initiative that elevates the voices of people and communities shaping marine conservation in Mexico through films, photography, and digital media. By using human-centered narratives, it bridges the gap between society and the ocean, making conservation accessible and inspiring. Over the past decade, Mares Mexicanos has highlighted 25 years of reef research in the Gulf of California and promoted Marine Prosperity Areas. Through projects such as *Voces del Mar, Tu Manglar, In Situ, Academia MM*, and *Atlas Acuática*, Mares Mexicanos demonstrates how storytelling can drive policy change, strengthen community pride, and inspire a collective vision for Mexico's seas.

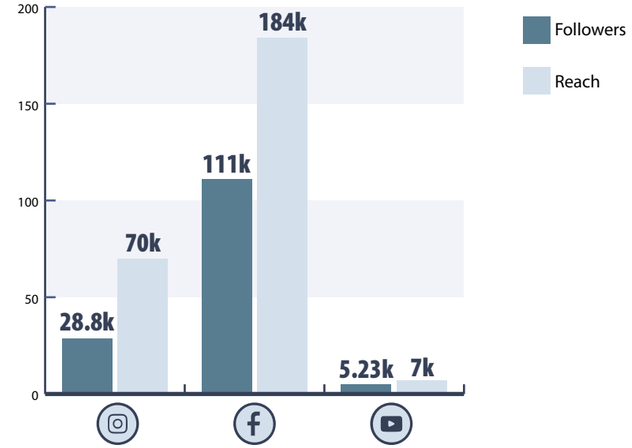
‘Memories of the Future’

In a remote region of Tabasco, over 200 km from the current coastline, researchers from the Gulf of California Marine Program uncovered a living relic of Earth’s ancient climate: a thriving red mangrove forest that dates back over 125,000 years to the last interglacial period. This inland forest reveals that sea levels were once 6 to 9 meters higher than today—and it’s not just a scientific curiosity.

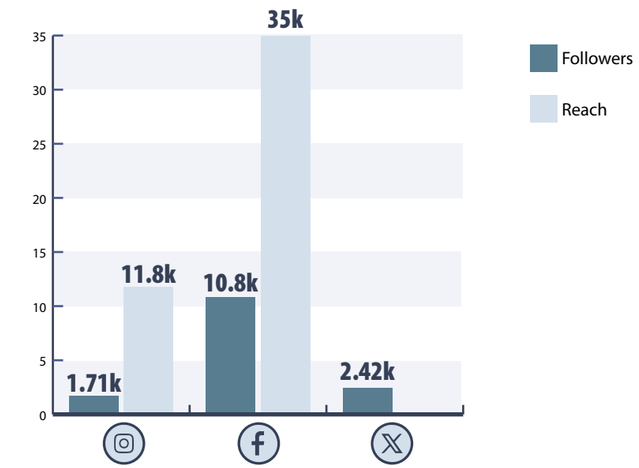
This scientific breakthrough gained global attention through the award-winning short film ‘Memories of the Future’, which premiered at the Jackson Wild Film Festival (formerly Jackson Hole) and received top honors for its striking visual storytelling. The film blended field research, underwater cinematography, and narration to bring the forest’s ancient story to life. It became a powerful message about climate change, sea-level rise, and the enduring value of Mexico’s ecosystems. It was both a scientific and communications triumph, which embodies the mission of the GCMP.

Social Media Impact 2025

Mares Mexicanos



dataMares



Scaling Marine Prosperity

Our Foundation

Over the past decade, the GCMP has redefined what science-based conservation can look like in Mexico. Building on the 2015 Strategic Plan, the program has strengthened its commitment to interdisciplinary research, cross-sector partnerships, and open access data. Mares Mexicanos and dataMares emerged to bridge science and society, while new tools such as chatMPA demonstrate the team's continued innovation in communicating complex findings to decision-makers and the public.

Evidence Into Action

Throughout this period, GCMP has produced long-term ecological datasets, shaped national fisheries and marine protection policies, and fostered a new generation of scientists and conservation leaders. Local fishers became data collectors and stewards, while students became storytellers and advocates.

Each initiative, distinct but interconnected, forms a cohesive pathway from science to tangible impact.

Looking Ahead: MPpAs

This foundation has culminated in the launch of Marine Prosperity Areas (MPpAs), a forward-looking framework that integrates ecological restoration with economic planning, policy design, and sustainable finance. MPpAs are not simply the next chapter of GCMP's evolution, they are the synthesis of everything the program set out to achieve a decade ago: **evidence-based conservation that supports both biodiversity and community well-being. As the Gulf of California accelerates toward the global 30x30 target, the MPpA model offers a roadmap for aligning marine protection with long-term resilience. The next five years of the GCMP's efforts will be guided by this framework.**

Acknowledgements

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