

Deep seamount biodiversity exploration and MPA monitoring strategies in the Colombian Pacific along bathymetric gradients



Project Code: PRY-BEM-006-24

Problem/Opportunity: Seamounts are a critical component of marine ecosystems, which host a variety of rich biodiversity and are highly productive habitats. In the Colombian Eastern Tropical Pacific (ETP) region, seamounts play a key role in supporting the ecological connectivity of key migratory species, as well as providing important climate refuge and gene flow between the depths. Despite this, data on deep-sea systems in the ETP are scarce with most seamounts in the region remaining under-explored due to technical and financial challenges. Emerging threats, including intense fishing, climate change and the prospect of deep-sea mining, create an urgent need for action.

Within the jurisdictional waters of the Colombian Pacific there are three deep-sea Marine Protected Areas (MPAs) with seamounts as key conservation features. Two of these MPAs are in the category of National Integrated Management Districts (DNMI) with over 15 million hectares of extension and one is a Sanctuary of Flora and Fauna – SFF Malpelo, both managed by the System of Natural National Parks of Colombia – (PNNC). These areas require the revision, design and evaluation of current management plans and conservation strategies.

General objective: To enhance the baseline knowledge that is key to improve the design of existing and newly established deep-water MPAs in the Colombian Eastern Tropical Pacific (ETP) region, while working to identify criteria for vulnerable deep-water areas that merit alternative management or further protection.

Specific objectives:

Objective 1. To improve baseline understanding of marine biodiversity patterns in deep seamount habitats in the Colombia EEZ, to estimate and protect these ancient seafloor systems before they are impacted.

Objective 2: To Improve integration of information on deep ocean systems into management and conservation actions in Colombia.

Target population: Eastern Tropical Pacific (ETP) region.



SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

UN Ocean Decade of Science and Sustainable Development Outcomes (Select with a click)

1. A clean ocean where sources of pollution are identified and removed	<input type="checkbox"/>
2. A healthy and resilient ocean where marine ecosystems are mapped and protected	<input checked="" type="checkbox"/>
3. A predicted ocean where society has the capacity to understand current and future ocean conditions	<input type="checkbox"/>
4. A safe ocean where people are protected from ocean hazards.	<input type="checkbox"/>
5. A sustainably harvested and productive ocean ensuring the provision of food supply	<input type="checkbox"/>
6. A transparent ocean with open access to data, information and technologies	<input checked="" type="checkbox"/>
7. An inspiring and engaging ocean where society understands and values the ocean.	<input type="checkbox"/>

Expected Outputs:

Objective 1. Output 1: A shared repository of deep-ocean data for use in further ocean research and conservation planning, including a road map and related proposals for ongoing research towards deep ocean conservation priorities.

Year 1. Technical paper on the characterization and modelling of inshore mesophotic seamount and terrace habitats at depths between 50m and 400m, considering known substrate morphology, community composition and associated oceanography in the SFF Malpelo.

Year 2. Contribution to a shared database of vessel opportunities and contacts for ETP deep ocean exploration to the CMAR working group.

Year 3. Peer-reviewed publications about the characterization and modeling of offshore deep benthic habitat >400m considering known community composition, geomorphology, and associated oceanography in the DNMI Colinas y Lomas.

Year 4. Curated deep-sea observation data and creation of a taxonomic bibliography, towards an updated biodiversity inventory for the Colombian Pacific through OBIS/GBIF in the public domain.

Objective 2: Output 1: Prioritization and visualization of deep-ocean conservation criteria and targets, considering creation of both vertical and horizontal management zones, resulting in one updated national

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MPA management plan for the DNMI Colinas y Lomas and SFF Malpelo.

Year 3. Diagnostic documents with criteria definitions and gap to identify vulnerable deep-water biodiversity, evaluating potential irreplaceable biodiversity, under-represented habitat conservation targets and recommending improvements to the ETP marine reserve network, considering also potential application to adjacent waters.

Year 4. Scientific reports with recommendations to update the management plans of two deep-sea MPA in the Colombian Pacific (DNMI Colinas y Lomas and SFF Malpelo) and the analysis of community composition across depth and geological features to assess ecosystem function and biological connectivity across the Colombian Pacific Region.

Objective 2: *Output 2:* The most advanced regional deep-ocean map to date, allowing identification, representation, and prioritization of deep water ETP conservation features Throughout the project length, which will be applied to support monitoring and management plans for Colombian Pacific deep-sea MPAs.

Year 1 to 3. Organization of training sessions aimed at the topics prioritized for the region (1) OBIS data mobilization in Year 1 (2) Marine Spatial Planning and use-optimization tools in Year 2 (3) Molecular and DNA sampling techniques in Year 3.

Objective 2: *Output 3:* To ensure wider community engage with the deep-sea Colombian Pacific seascape throughout the project length.

Year 1 to 4. A suite of outreach materials and infographics that improve awareness about these fascinating, yet poorly understood ecosystems shared through social media with local, national, and global audiences throughout the project.

Objective 2: *Output 4:* Research integrated into conservation and management of the ETP deep-water systems.

Year 3 to 4. Participate jointly in events to contribute to the development of a regional open-water MMA research plan with regional research and conservation partners, support its consolidation, and provide expertise and logistical sampling opportunities from Colombia.

Objective 2: *Output 5:* To ensure that regional ocean governance mechanisms in the ETP under discussion (such as the Biosphere reserve proposal and the importance of Biodiversity beyond Areas of National

Jurisdiction etc.) are informed by knowledge of deep-water conservation features.

Year 3 to 4. Meetings with institutions from the ETP region to:

1. Support the scoping and proposal development for use of automated surface and underwater sampling and bathymetric mapping vessels to fill critical information gaps necessary for improved governance of deep ocean systems in the ETP region.
2. Regional stakeholder access/use mapping, trade-off analysis and scenario-testing, examining cost/ benefit for sustainable practice and use-zoning of ETP deep water areas.
3. An ETP deep-ocean synthesis brief with project recommendations prepared and shared with CMAR, managers, donor groups and policy makers towards inclusive representation of deep water and seamount habitat in 30x30 ocean-protection goals.
4. Actively participate from the establishment of open science networks for deep-water research in the ETP region in support of regional governance organizations such as CMAR and the CPPS, contributing to the common framework and goals of the UN Decade of Ocean Science for Sustainable Development (2021-2030).
5. Support the development of deep-water habitat conservation criteria and indicators prepared for annual MEE and regional marine spatial planning exercises, in an accessible GIS Atlas format for ETP Marine Reserve users and managers.

Geographic area of the project: SFF Malpelo and DNMI Colinas and Lomas.

Duration: start 01/05/2024 end 01/05/2028

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Institutions participating in the project: INVEMAR, Parques Nacionales Naturales de Colombia, Charles Darwin Foundation, Smithsonian Tropical Research Institute, Friends of the Cocos Islands Foundation and University of Costa Rica's Center for Ocean Research and Limnology.

INVEMAR programs, areas or coordinations participating in the project: BEM y GEZ

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Sustainable Development Goals List of Images

SDG 1: Eradicating poverty in all its forms.		SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable	
SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.		SDG 12: Ensure sustainable consumption and production patterns	
SDG 3: Ensure healthy lives and promote well-being for all at all ages		SDG 13: Take urgent action to combat climate change and its impacts	
SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all		SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development	
SDG 5: Achieve gender equality and empower all women and girls		SDG 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
SDG 6: Ensure availability and sustainable management of water and sanitation for all			
SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all			