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TRANSFORMATIVE ACTIONS. SOLUTIONS #42

PROTECTION AND MANAGEMENT OF MARINE-COASTAL SEASCAPES: LESSONS LEARNED FROM A COSTA RICAN EXPERIENCE.

Task group session during one of the workshopsl.
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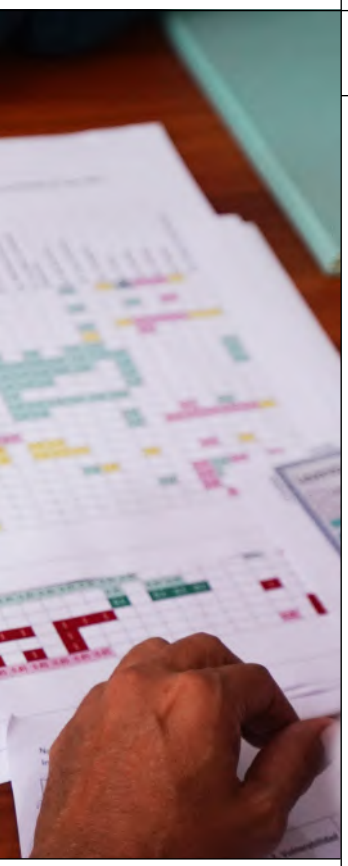
In 2023, the Costa Rican National System of Conservation Areas (SINAC) conducted a comprehensive review and update of its prioritisation of coastal-marine consvervation sites. During this process, they successfully transformed their approach with the collaborative support of academia, government agencies, NGOs and the private sector, including fisheries and tourism. The country is committed to safeguarding the most representative marine biodiversity areas and improving the sustainable management of its resources.

> **"TO ENSURE AND MAINTAIN REPRESENTATIVE SAMPLES OF OUR COUNTRY'S NATURAL WEALTH, IT'S CRUCIAL – PARALLEL TO IDENTIFYING PRIORITY SITES – TO SEARCH FOR GOVERNANCE MODELS WITH INNOVATIVE CONSERVATION INITIATIVES THAT HELP ADDRESS THOSE SITES PROPERLY. AT SINAC, WE SEEK TO BALANCE CONSERVATION AND PRODUCTIVE ACTIVITIES OF NATIONAL AND LOCAL RELEVANCE"**
>
> - Jenny Asch-Corrales, Coastal-Marine Program Coordinator, SINAC, Ministry of Environment and Energy (MINAE)

In recent decades, Costa Rica has witnessed a decline in several marine resource groups due to various pressures affecting its marine-coastal seascape[1]. These pressures include unlimited exploitation without scientifically determined and respected quotas; the loss or degradation of coastal habitats that serve as refuges, nesting, feeding, and breeding areas for multiple species; pollution reaching marine waters from the coasts, boats, and port infrastructure; and the impacts of climate change[2,3].

By enhancing its protected-area system to make it more effective and well connected, Costa Rica has made significant contributions to the goals of the Kunming Montreal Global Biodiversity Framework (KMGBF) and has become an exemplary model for other countries facing similar challenges. A key issue for the country is to identify priority sites that can be conserved by either integrating them into protected areas or by managing them sustainably through established and recognised mechanisms, such as 'Other Effective Area-based Conservation Measures' (OECM)[4].



Participants in the third workshop, calculating a conservation target ©Daniel Murillo Solano

1. IMPROVING COASTAL-MARINE CONSERVATION PROCESSES

Costa Rica's efforts towards conserving its seas

Costa Rica's conservation efforts have regularly been directed towards the conservation of ecosystems in emerged land, even though nearly 92% of the country's jurisdictional territory is marine[5]. In 2008, the government carried out its first prioritisation for coastal-marine conservation through a series of processes known as GRUAS II [6].The GRUAS II initiative identified **35 Sites of Importance for Conservation** that showed prominent conservation gaps. Building on these findings, **SINAC and other stakeholders engaged in a series of participatory processes that resulted in the creation or expansion of seven Marine Protected Areas (MPAs).**

Conserving both the Pacific and Caribbean coasts

In 2009, following a two-year dialogue process with the private sector, the Conchal National Wildlife Refuge was successfully established[7]. That same year, the Camaronal National Wildlife Refuge was extended to integrate a larger marine sector[8]. Four years of participatory consultations led in 2017 to the creation of the Cabo Blanco[9] and Santa Elena Bay Marine Management Areas[10], with significant involvement from the surrounding fishing communities.

On the Caribbean side, however, no marine conservation areas had been declared since 1985. But collaboration between environmental and fishery institutions led to the creation of the Barra del Colorado Marine Management Area in 2020[11], providing protection to a Caribbean coastal area dedicated to artisanal fisheries. It is known as the Barra del Colorado Responsible Marine Fishing Area[12].

Parallel to this achievement in the Caribbean, SINAC initiated a consultation process in 2020 to expand the Cocos Island National Park and the Seamounts Marine Management Area. The goal was to enhance protection of a marine corridor running from the Galapagos Archipelago to Cocos Island[13]. By the end of 2021, following a complex consultation process[14], the Cocos Island National Park was expanded to an area slightly larger than the country's terrestrial landmass[15]. Following recognition of the need to safeguard migratory species, biodiversity, and endemism linked to the seamounts of the Cocos Submarine Volcanic Mountain Range, the Bicentennial Marine Management Area was created in December 2021.[16]

All these newly established MPAs significantly increased Costa Rica's protected marine surface area, from 4,213 km2 in 2007 to 161,419 km2 in 2022, representing 28.6% of the country's marine territory. These conservation efforts have brought the country closer to fulfilling its commitments to Target 3 of the KMGBF.

2. A NEW PROCESS TRIGGERED

In 2022, SINAC initiated a new conservation and management consultation process with support from the Post 2020 Biodiversity Framework - EU Support, a project funded by the European Union and implemented by Expertise France, as well as from the Costa Rica Forever Association through the Costa Rica Forever Private Trust. T**his collaborative effort sought to identify priority areas in the marine and coastal environment that would act as a contribution to the implementation of the CBD and its KMGBF.** The goal was to maintain representative samples of Costa Rica's marine natural richness, either through traditional protected areas or through innovative management and conservation initiatives.

Need for a new approach

Over time, pressures and threats on biodiversity and ecosystems have increased as a result of activities on land[17] or have been exacerbated by climate change[18]. **This development prompted SINAC to reflect on the existing conservation and management framework to identify mitigation actions and implement adaptation measures**[19]. This led to extending the concept of conservation **beyond absolute protection to include the idea of 'safeguarding' potential sustainable use.** This aligns with the CBD's vision of 'Living in Harmony with Nature by 2050' and also contributes to the achievement of Targets 1 (Land and Sea use changes) and 3 (Protected Areas and OECMs) of the KMGBF. The conservation of significant marine areas to preserve valuable biodiversity and maintain essential ecosystem services for coastal communities has always been closely tied to the establishment and effective management of MPAs[20].

3. REVIEWING, TUNING AND IMPLEMENTING

Ecoregional Conservation Planning: a tool for better conserving and managing marine areas

The Ecoregional Conservation Planning (ECP) methodology[21] provides step-by-step guidance for determining sites of interest for conservation. It is based on the collection and management of the information needed to set out conservation objectives and to assess their viability and threats. The process leads to the selection and design of a portfolio of conservation sites. The ECP methodology has been widely used around the world[22], with Costa Rica no exception, as the marine ecoregional assessment process that served as the basis for GRUAS II already used this approach[23].

Defining Ecological Marine Units

To follow these guidelines, the initial step involved revising the spatial framework, particularly on the stratification[24] of the Costa Rica Exclusive Economic Zone. This entailed selecting, delineating and defining spatial units known as Ecological Marine Units (EMUs)[25], resulting in the delimitation of 25 entities.

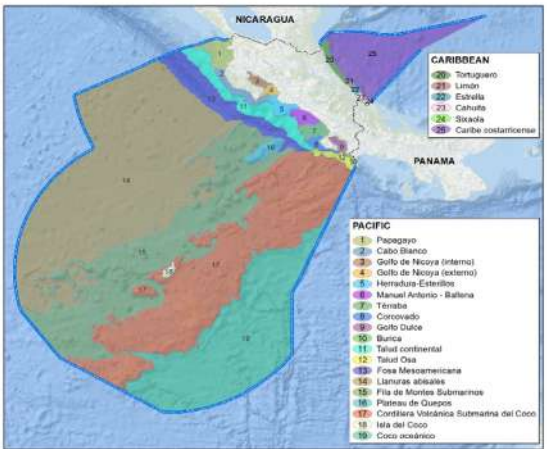


Figure 1: Delimitation of the 25 Ecological Marine Units

1 Castro-Campos & Jiménez-Ramón (2021). Atlas Marino-Costero del Golfo de Nicoya, Costa Rica. Fundación MarViva, Costa Rica. pp. 106-137.

2 BIOMARCC-SINAC-GIZ (2013). 'Análisis de vulnerabilidad de las zonas oceánicas marino-costeras de Costa Rica frente al cambio climático'. Costa Rica.

3 Ross-Salazar, Lizano-Rodríguez, Chacón-Chaverri & Castro-Campos (2018). Estudio de caso: adaptación de las comunidades costeras vulnerables ante las amenazas inminentes del cambio climático en el área de Paquera, Puntarenas. Fundación MarViva, Costa Rica.

4 IUCN-WCPA Task Force on OECMs (2019). Recognising and reporting other effective area-based conservation measures.

5 Costa Rican jurisdictional territory is 630,141 km2, of which 578,972 km2 are marine territory (91.88%) and 51,169 km2 are emerged lands (8.12%).

6 SINAC (2008). GRUAS II: Propuesta de Ordenamiento Territorial para la conservación de la biodiversidad de Costa Rica. Volumen 3: Análisis de Vacíos en la Representatividad e Integridad de la biodiversidad marina y costera.

7 See Executive Decree 35426 / 8 May 2009.

8 See Executive Decree 35530 / 27 August 2009.

9 See Executive Decree 40442 / 2 June 2017.

10 See Executive Decree 41171 / 5 June 2018.

11 See Executive Decree 42422 / 30 June 2020.

12 See INCOPESCA Board Agreement 549/2019.

13 Castro-Campos (2022). Espacios marino-costeros dedicados a la conservación en el litoral Pacífico de Costa Rica: una ampliación del conocimiento, 2012-2021.

14 Some groups of fishermen did not feel properly represented.

15 See Executive Decree 43368 / 16 December 2021.

16 Ibidem.

17 Gómez (2013). Contaminación costera en Costa Rica.

18 Lizano (2013). Erosión en las playas de Costa Rica, incluyendo la Isla del Coco.

19 Morales-Ramírez & Caviedes (2016). 'Cambio climático y recursos marinos'. Revista Ciencia y Tecnología, pp. 15-25.

20 Ross-Salazar, E. (2013). Evaluación del Parque Nacional Marino Ballena y zonas aledañas.

21 Groves, Valutis, Vosick, Neely, Wheaton, Touval & Runnels (2000). Designing a Geography of Hope. A Practitioner's Handbook to Ecoregional Conservation Planning. The Nature Conservancy, Arlington, VA, USA.

Dancing whale coming home (southern Pacific of Costa Rica)
©José David Palacios-Alfaro

Identifying Focal Elements for Management

As part of the methodological process, the selection of 'Focal Elements for Management (FEM)' (also known outside of Costa Rica as 'Focal Biodiversity Elements') was updated and documented for each EMU[26]. The update included adoption of an innovative approach focused on better weighting ecosystems and habitats of importance for significant animal and plant species, such as high-trophic-level[27], umbrella[28], rare and endemic[29] species found in the national marine-coastal environment (e.g. sharks and rays, cetaceans and billfish).

While an exhaustive literature review was used for this prioritisation process, collaborative cartography played a crucial role in obtaining additional information that had not yet been published or that involved areas with limited available data.

This reorganisation has expanded the number of FEMs in 3 categories:
1. ecosystems and oceanic phenomena (e.g. methane seeps[30] and upwelling[31]), seabed features and substrates
2. coastal habitats with limited ranges (e.g. mangroves, coral reefs and specific coastal types)
3. areas of importance for specific groups (e.g. marine turtles).

While species of biological and ecological significance are crucial in this process, the inclusion of cultural and social aspects is also essential. Species valued by local communities can have a significant impact on culture and economy. They can potentially act as umbrella species that encourage local participation and increase the likelihood of long-term conservation project success. Additionally, the inclusion of these species can help preserve cultural traditions and aspects. Through proper monitoring, indicator species can demonstrate the health of the ecosystem; their disappearance, on the other hand, can negatively impact ecological balance.

"IN THE FACE OF THE CLIMATE CRISIS AND THE ACCELERATED LOSS OF BIODIVERSITY, THE GRUAS III INITIATIVE IS OF GREAT VALUE BOTH FOR MARINE SPATIAL PLANNING AND FOR THE USE AND MANAGEMENT OF ECOSYSTEMS AND THEIR BIODIVERSITY. IT MAKES IT POSSIBLE TO SYSTEMATISE THE ADVANCES MADE BY SCIENTISTS AND EXPERTS AND HIGHLIGHT THE EXISTING INFORMATION GAPS, RESEARCH AND MONITORING OPPORTUNITIES."

- Mónica Gamboa-Poveda, Marine Conservation Manager, Forever Costa Rica Association

Calculating conservation targets

Once the FEMs were identified, the next step was to estimate, for each FEM, the target extent (percentage) that should be considered for the application of conservation or management measures to maintain healthy populations and communities. The calculations were made based on the EMU in which the FEMs are located, their conservation status, the level of pressure and their general distribution as well as input from the geographical information system analysis and from the experts involved during participatory and inclusive consultation processes.

Besides this evaluation, it was necessary to identify and qualify the main pressures and threats on the FEMs. Twenty of these were identified and categorised based on their environmental origin: terrestrial (such as infrastructure development and pollution sources), marine (including various fisheries and navigation routes), and those associated with the consequences of climate change (such as coastal erosion and rising water temperatures).

Multicriteria analysis and scenario genesis

For analysis of all the variables, a tool called Marxan[32] was chosen, which allowed continuity with previous processes and thus a standardised evaluation and the possibility of comparison. Using the tool made it possible to obtain multiple scenarios by combining and analysing information on the distribution of the 49 FEMs and the 503 conservation goals set out for them. This process is pondered by the use of a cost surface[33]. Each scenario created is a result of the choice of layers of information considered, their combination and the conservation goals assigned to the FEMs. The use or non-use of any of them, or strategic adjustments in the dataset entered, help identify the ecological importance of the FEM to achieving conservation objectives where there is less pressure – in short, to find efficient solutions while achieving the proposed conservation objectives.

From the nine scenarios generated, a total of 35 sites of Importance for conservation and management were identified, ranging from conservation gaps in some environments of interest, to areas for sustainable management outside of current protected area systems. It is recommended that future updating processes using this approach maintain methodological uniformity, particularly through the comparison and re-evaluation of the established variables

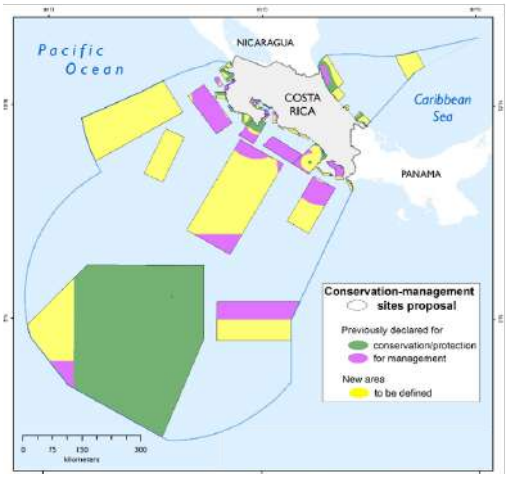


Figure 2: Sites of Importance for Conservation and management identified

4. INCLUSIVE GOVERNANCE

In the process of designing potential new protected sites and managing coastal and marine areas, **the traditional approach to creating protected areas has evolved: the importance of productive marine-coastal zones that contribute to the long-term sustainability of marine resources is now recognised.**

The experts participating in the consultation process reaffirmed the need to complement the traditional approach to conservation with active development of innovative and participatory governance models, such as OECMs, which could include, but not be limited to, Responsible Marine Fisheries Areas and Tuna Purse Seine Exclusion Zones[34]. This has led to greater coordination and joint work between SINAC and INDOPESCA.
In the absence of a legal framework that embraces and strengthens OECMs as a conservation mechanism, SINAC has been investing time and effort into securing long-term access to resources for users and at the same time has been monitoring and preserving the environment through the promotion of sustainable practices.

22 Northwest Atlantic Marine Ecoregional Assessment, Tuungane Baseline Freshwater Ecological Survey in Tanzania, Coral Triangle between the Pacific and Indian oceans, among others.

23 TNC (2008). Evaluación de ecorregiones marinas en Mesoamérica. Sitios prioritarios para la conservación en las ecorregiones Bahía de Panamá, Isla del Coco y Nicoya del Pacífico Tropical Oriental, y en El Caribe de Costa Rica y Panamá. Regional Science Program, Mesoamerican and the Caribbean Region. The Nature Conservancy, Costa Rica.

24 Way of ordering in which characteristics in systems or organisms allow a spatial or a temporal grouping. In aquatic systems, spatial stratification is usually determined by water depth, light penetration, and temperature.

25 Set of spatially distinguishable marine-coastal systems, which have distinctive patterns in some environmental and biological variables, such as temperature, depth, continental inputs, coastal morphology, and species composition. (TNC, 2008)

26 In other words, representative elements of biodiversity on which conservation and management efforts are focused. (SINAC, 2023a)

27 The trophic level describes the number of intermediaries between basal species and predators throughout the food web and helps define species' roles in the ecosystem.

28 A species whose protection is anticipated to extend to a significant number of naturally coexisting species.

29 Endemic species are found in a single defined geographic location, such as an island, State, nation, country, or other defined zone.

30 Type of cold seep (sometimes called a cold vent) located in an area of the ocean floor where methane and other hydrocarbon-rich fluid seepage occurs, often in the form of a brine pool. Cold seeps develop unique topography over time, where reactions between methane and seawater create carbonate rock formations and reefs. These reactions may also be dependent on bacterial activity.

31 Upwelling is an oceanographic phenomenon that involves wind-driven motion of dense, cooler, and usually nutrient-rich water from deep water towards the ocean surface. It replaces the warmer and usually nutrient-depleted surface water. The nutrient-rich upwelled water stimulates the growth and reproduction of primary producers such as phytoplankton.

32 Ball, Possingham & Watts. (2009). Marxan and relatives: Software for spatial conservation prioritisation. Available at: https://marxansolutions.org/

33 This is the dataset that results from the overlapping of layers with the distribution of uses and pressures. Each cell is assigned a value that represents the sum of the degrees of effects that each use generates in that minimum space or cell. Its use is key in the site prioritisation phase.

Picture 1: Manuel Antonio National Park. ©Lisa Van-vliet

Picture 2: Samara, Costa Rica (2017) ©Max Böttinger

34 Purse seines consist of an encircling net with a bottom that is drawn together by a purse line.

35 Executive Decree 41775 / 30 July 2019.

36 Management and governance model of a marine territory in which different legal regimes and economic activities will coexist (with sustainable use as well as conservation and restoration of marine resources included within the model). It considers environmental, social and economic variables, including the climatic variable.

37 Natural process of deposition by water and wind of material degraded by weathering and erosion.

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This approach takes into account the needs of coastal communities and the conservation status of resources. Its full implementation relies on the strengthening of the Marine Governance Commission[35], a ministerial-level legal mechanism that promotes inter-institutional coordination and participatory management of marine resources. Its goal is to ensure the sustainable use of ecosystem services provided by the marine environment and to ensure active and effective participation of society in the overall management of the sea. This is achieved through the zoning of Costa Rica's jurisdictional waters and the establishment of regional bodies for formal citizen participation, known as Marine Governance Units[36]. Each Marine Governance Unit includes a Coastal-marine Committee composed of an interdisciplinary technical team representing government institutions, NGOs and various sea-user sectors. Its role is to propose, support and oversee the development and implementation of Marine Master Plans, strategies, action plans and any other activities required for the proper management of Marine Governance Units.

"THERE'S A NEED FOR A NATIONAL REPOSITORY OF TECHNICAL AND UPDATED INFORMATION ON THE MARINE-COASTAL AND OCEANIC ECOSYSTEMS OF COSTA RICA. INFORMATION ACCESS IS ESSENTIAL FOR IMPLEMENTING EFFECTIVE MANAGEMENT MODELS FOR THE PRIORITY AREAS. THE STARTING POINT SHOULD BE TO ENHANCE COOPERATION MECHANISMS BETWEEN PUBLIC INSTITUTIONS, ACADEMIA, NGOS AND THE PRODUCTIVE SECTOR."
- Jorge Picado-Barboza, National Coordinator, EF

Effective process for the protection and management of marine-coastal seascapes

Costa Rica's improvements in governance have earned it international recognition. The country plays a significant role in global campaigns and, together with France, leads the High Ambition Coalition for Nature and People, a group of States dedicated to encouraging more countries to commit to the ambitious 30x30 Target, which aims to protect 30% of the seas by 2030 in order to preserve and restore marine ecosystems.

The prioritisation process described in this paper has provided valuable lessons learned for future iterations in the country and replication in other national contexts. The main lessons are as follows:

+ There is a need **to institutionalise the process of identifying and prioritising areas for conservation and management**, as well as of monitoring the progress made. This requires the establishment of a standardised working protocol covering the various stages of the process (data collection, systematisation, progress tracking, and proposals for improvement).

+ A good way to make up for lack of progress on governance is to **strengthen the Marine Governance Commission or its equivalent, as an interdisciplinary technical body in which different sectors of society with divergent opinions and interests propose socially fair, economically profitable and environmentally sustainable solutions**, thereby democratising civil participation in decision-making.
+ It is essential to **strengthen the interinstitutional collaboration and coordination on access to information on fisheries statistics.** The format and quality of the data and the periodicity with which the reports are provided should be reviewed. Likewise, attention must be paid to improving access to information from regional institutions that handle information collected in national waters, so that it provides the quality and level of detail required for marine spatial planning and conservation prioritisation processes.
+ Urgent action is required, supported by updated legal instruments, **to promote an open-data culture by which scientific publications are disseminated as soon as they are available.** Creation of geospatial databases should be encouraged for all research carried out in the marine-coastal and oceanic environments.
+ To ensure long-term vision, proposals for any new conservation site and progress in their implementation must include the overarching consideration of controlling the threats and pressures that affect them.

The efforts described in this paper undoubtedly provide valuable input for territorial planning, with special emphasis on processes such as sedimentation[37] and coastal pollution resulting from human activities within watersheds. Indeed, there are few efforts in which the land-sea vision is clearly emphasised, and national policy lacks a methodological approach. This marine-coastal process and the subsequent processes of prioritisation of areas for terrestrial and inland water conservation are an opportunity for the country to create critical mass, consultation mechanisms, interinstitutional administrative procedures, and a common data infrastructure, among many other benefits

With this approach, Costa Rica is committed to enhancing the management of coastal and marine resources by enabling greater citizen participation. This enables authorities to identify conflicts and explore alternative solutions while meeting their national and international commitments.

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