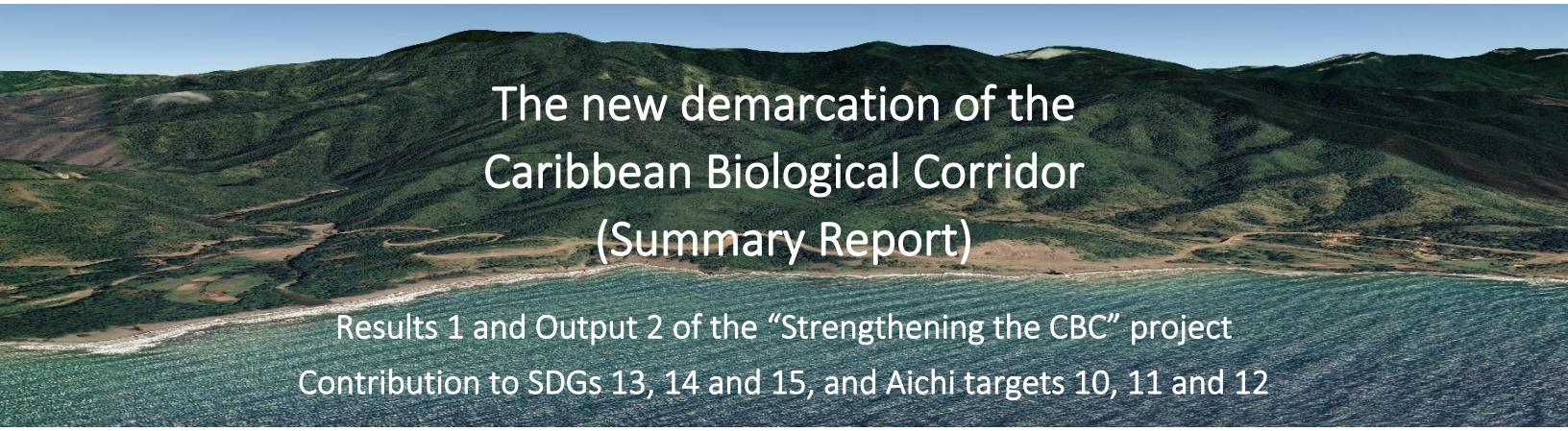
CORREDOR BIOLÓGICO EN EL CARIBE

Our space… our life

"Strengthening the Caribbean Biological Corridor" Project



The new demarcation of the Caribbean Biological Corridor (Summary Report)

Results 1 and Output 2 of the "Strengthening the CBC" project

Contribution to SDGs 13, 14 and 15, and Aichi targets 10, 11 and 12

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Document: Scientific-technical report containing the initial version of the new demarcation of the CBC

Responsibility:

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Content

1. Introduction

When the agreement was renewed in 2014, a governance system was created for the initiative that was ratified as a mechanism for fostering and promoting cooperation and knowledge exchange and transfer to achieve environmental protection objectives through South-South cooperation. The initial demarcation of the Corridor was recognized and ratified at that time. However, the possibility of this being reviewed from time to time to ensure the integrity of the land and marine ecosystems was left open.

The guidelines for the future development of the CBC initiative were drawn up in the same year. These state the need to define indicators and to delimit marine zones in the CBC in response to climate change. The Guidelines also recognized the need to review the demarcation and threats in the CBC's core land zones and to project these for future expansion of the initiative, considering the climate change affecting the CBC area. Puerto Rico's entry as a full member of the initiative was approved in 2016. This made a thorough redesign of the demarcation of the CBC essential to include all of the essential ecosystems, both on land and at sea, and to preserve the most representative values of Caribbean biodiversity in the islands comprising the CBC, together with their ecological connectivity and the provision of ecosystem services on a regional scale.

Analysis and development of the CBC have been included as key outputs for the current Strengthening the CBC Project in order to update and extend its demarcation. The project only affects the three countries that founded the initiative, but it was decided to include Puerto Rico and Jamaica in the studies for the new demarcation in order to meet the 2014 objectives. Puerto Rico is now a full member and Jamaica aspires to full membership. The effective extension of the CBC to the marine environment is an important step in the development of the new proposal. This extends the potential geographical scope to include territorial, archipelago and interior waters, and the economic zones of the aforementioned countries and territories.

This document summarizes the results of the study of the new demarcation for the CBC initiative by the CBC Secretariat, which were approved by Decision 1 of the Ministerial Committee of April 2021. Details of the methodology and results can be found in the full Proposal for a New Demarcation of the Caribbean Biological Corridor document.

2. Materials and methods

2.1 Information base

The demarcation was based on maps prepared using the coarse filter priorities approved by the Technical Committee in November 2019. The information used and the procedure for preparing the maps are explained in the full document. Maps of the distribution of priority land species for which information was available were also used. These were downloaded from the IUCN Red List of Threatened Species. The information for the priorities was further refined using the following cartographic resources:

1. Distribution areas of the Antillean manatee
2. Nesting sites of marine birds
3. Nesting sites for sea turtles
4. Spawning sites for fish
5. Important zones for bird migrations

The World Database of Protected Areas of the UNEP-World Conservation Monitoring Center was used as a source for the protected area boundaries. Adjustments were made for Haiti using up-to-date information provided by the Ministry of the Environment of that country. A limitation of the source is that it does not always distinguish currently administered areas from those proposed or identified for declaration but were reported as protected areas by the countries. However, for the purposes of the demarcation this was not considered a handicap for its use.

2.2 Methodology

The priorities in the coarse and fine filters and the complementary information were processed in the geographic information systems to determine the demarcation. This is summarized in figure 1.

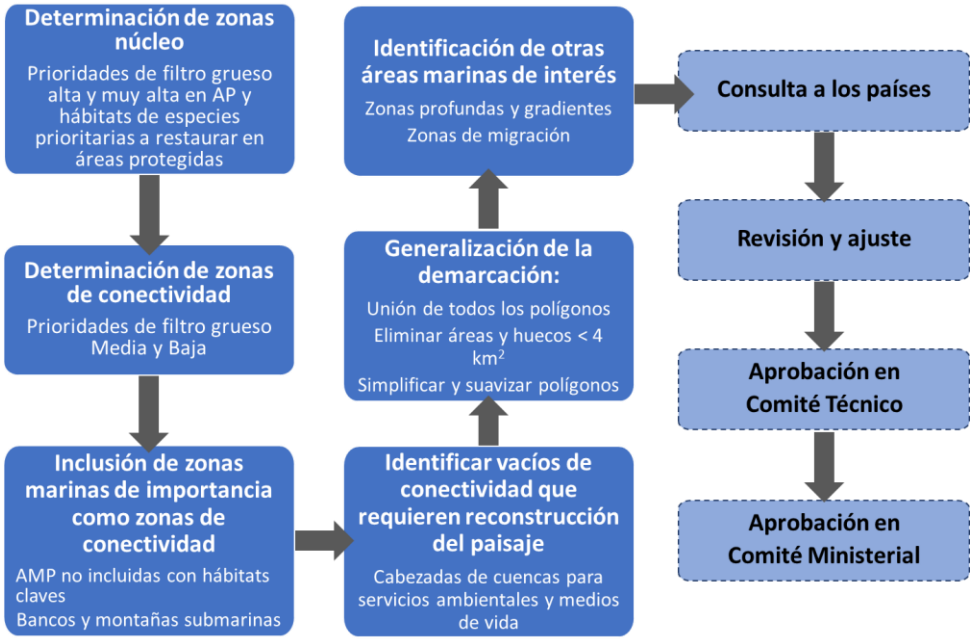


Figure 1: General procedure for the demarcation of the CBC.

2.2.1 Determination of the core zones

It was decided to determine the core areas based on connectivity and representativeness priorities for the conservation objectives in the coarse filter (ecosystems). Based on earlier analysis of priorities, the importance of an area as a potential core area was categorized by combining the partial indexes for connectivity and representativeness obtained in the analysis using the coarse filter priorities, following a set of rules for assigning importance as potential core areas. In general, the rules follow the principle that the level of importance is determined by the highest value in each combination of representativeness and connectivity categories. For example, if the representativeness category is rated as one and the connectivity category is three, the level of potential importance as a core area is rated as three.

Resilience to climate change (CC) is not included in the selection of core areas, as the results achieved for this criterion are only considered preliminary, due to the limitations and diversity of the information used. Therefore, independent analysis using a specific methodology will be required to recommend which core areas should be the priority for reducing vulnerabilities and improving resilience.

Ecosystem patches were then analyzed to identify whether they were in strictly or less strictly protected areas, or unprotected areas, assigning greater weight as core areas to ecosystems that are already protected and have the most restrictions on use. The full document details the criteria used to define the protected areas to be considered restricted in each country or territory.

The distribution of priority species (the conservation objects from the fine filter for land plus the Antillean manatee) were also considered. This information was complemented with the distribution of other sites of importance for connectivity: nesting beaches for sea turtles, nesting sites for birds, spawning grounds for snappers and groupers, and important zones for migration.

The following were then identified as core areas:

1. Sites with conservation objects of High or Very high importance using the coarse filter in protected areas classified as restricted or non-restricted management.
2. Sites with High importance conservation objects using the coarse filter outside protected areas and all High priority mangrove swamps in Cuba not included in any of the previous cases.
3. All of the sites in the protected areas in restricted management categories not classified in the previous cases but that constitute part of the distribution of other species subject to conservation using the fine filter, such as sites representing the habitats of the American crocodile (*Crocodylus acutus*) in La Española, the Antillean manatee (*Trichechus manatus manatus*), the Cuban solenodon (*Solenodos cubanus*) in the Toldo plateau and the Puerto Rican iguana (*Cyclura stejnegeri*), together with the habitats of numerous amphibians and some birds. Because of their importance, some habitat sites for the manatee in areas not subject to strict protection in Cuba and the Dominican Republic and other zones of particular importance for regional connectivity were also included.

The core zones can be divided into two sub-types, based on the indicators used: Core zones selected mainly because of conservation objects from the coarse filter (those that meet criteria 1 and 2); and Core zones chosen mainly due to fine filter conservation objects (those that meet criterion 3 in protected areas in restricted management categories)

2.2.2 Determination of connectivity zones

Zones of importance for maintaining connectivity between the core zones. All sites where there are priority ecosystems categorized as medium or low importance (values of zero to one) outside the restricted management category protected areas, which are considered conservation core zones for this reason, were included.

These are important zones for maintaining local and regional connectivity that in some cases might require improvement or restoration to maintain connectivity through patches of reforestation, sustainable forest use or other conservation measures in productive landscapes where some green infrastructure has been maintained. Sites within the distribution areas of priority species but outside the protected areas that require actions to improve their connectivity were also included.

This zone is subdivided into two sub-types: strong structural connectivity, i.e. where the conditions of the ecosystems, their location and the distance to core zones create conditions that facilitate connectivity; and limited connectivity, when some of these aspects are absent or the areas need work to improve their connectivity

Strong connectivity includes sites that meet one of the following criteria:

1. Sites of high importance outside protected areas and degraded sites within the distribution of priority species that are adjacent to or that connect protected areas.
2. All sites with protected areas in non-restricted management categories that are not classified as core because they have less important ecosystems (values of zero to one) or that are distribution areas for CBC priority species or sites of importance for regional connectivity, or that could have better connectivity because they are in protected areas.

Limited connectivity includes all sites with priority ecosystems outside protected areas classified as being of lower importance.

2.2.2.1 Inclusion of marine zones of importance as connectivity zones

Only coral reefs had been considered in the marine environment. Therefore, the marine connectivity zones have been completed by adding protected marine areas in the strict categories that are recognized as belonging to important habitats for priority CBC species, such as snappers, groupers, sharks, rays and marine mammals. Sites outside marine protected areas that are priority sites for regional connectivity, due to being nesting beaches for sea turtles, nesting sites for sea birds or spawning grounds for snappers and groupers, are also included.

2.2.3 Determination of landscape reconstruction zones and their connectivity

It was found that in some areas the connectivity elements between ecosystems or green infrastructure for migration had disappeared or were in very poor condition. Measures to restore the landscape and connectivity are therefore required. Although these areas were not included in the current version of the demarcation, a next round of planning should proceed to the identification and prioritization of these sites to guide the processes of their ecological and productive restoration.

The ecological and productive restoration of ecosystems and landscapes in areas where they have been degraded will be an important contribution to the reconstruction of connectivity and the conservation of biodiversity; but, in addition, it will be an important contribution to the recovery of environmental services provided by ecosystems and for adaptation to climate change.

2.2.5 Refinement of the demarcation

Once all the points assessed had been assigned to these categories, the resulting boundaries were then refined to eliminate small and isolated areas from the demarcation that are obviously not determining factors for a robust demarcation. For this reason, patches outside protected areas with an area of 10 km^2 or less were not considered, unless they had high priority for regional connectivity, despite their size. This is the case for example with nesting sites for sea turtles and birds, spawning grounds for fish and important zones for migration. Any voids within the demarcation with an area of 10 km^2 or less were also eliminated. Any patches in the resulting demarcation that were less than 1 km apart were then merged. Finally, the boundaries were refined, and the lines smoothed to obtain a simpler cartographic representation of the demarcation.

3. Results of the demarcation

3.1 General results

To carry out the new demarcation, 14 fine filter and 4 coarse filter priorities were identified that are shared by the countries and were approved by Decisions 8, 9 and 10 of the 2019 Ministerial Committee.

This yields a total of 18 shared biodiversity values that will be incorporated into the National Biological Diversity Strategies and protected areas management plans of greater importance to the CBC. With this, indicator 2.3.2 of the CBC Strengthening project *(Number of shared common values to be included in the national management plans for the identified key biodiversity conservation areas*) was fulfilled, which had a target of identifying and implementing six to ten characteristics.

Processing the information resulted in the proposed demarcation presented in Map 1, (see details in https://bioatlas.cbcbio.org). This covers a total area of 142,007 km^2, of which 28,746 km^2 (20%) corresponds to core zones and 113,261 km^2 (80%) to connectivity zones. Figure 2 (a and b) shows the distribution proposed by CBC for the land and sea areas and the zones. Eighty percent of the proposed demarcation covers coastal-marine areas, of which 77% corresponds to connectivity zones; while in the land areas, 30% corresponds to connectivity and 70% to core conservation areas. Regarding the latter, the CBC would make a significant contribution to the post-2020 conservation agenda, which aspires to a minimum of 30% of territories being dedicated to conservation. The limited nature of the areas in the marine environment selected as being core is noteworthy. This is particularly because this study only considers coral reefs and ad hoc sites of importance for regional connectivity. More in-depth analysis using other criteria is possible to improve the marine demarcation of the CBC. Work has begun on this.

When the distribution of the proposed demarcation by countries is considered (Table 1), we observe that the Dominican Republic has the largest area of the CBC, accounting for 45% of the demarcation, followed by Cuba, with 34%. However, if we consider the distribution by types of zones, Cuba has 48% of the core zones, followed by the Dominican Republic with 37%.

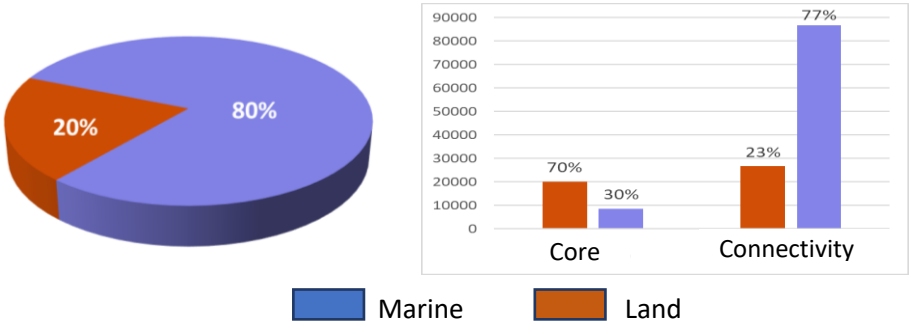


Figure 2: a) Distribution of the proposed demarcation by environment. b) Percentage distribution of the proposed demarcation by environment and zone

The land distribution of the demarcation in relation to the area of each country (Table 2) varies between 11% for Puerto Rico and 35.3% for the Dominican Republic. The Dominican Republic has the highest proportion of core zones, covering 18.8% of its territory. It is followed by Jamaica and Cuba (13% and 7.5%), with Puerto Rico and Haiti having 3.9% and 3.3% of their territory in core areas, respectively.

Table 3 presents the demarcation by protected areas and zones by IUCN categories. 71% of the demarcation is in protected areas and 56% in restricted protected areas. Almost 96% of the CBC core zones are in protected areas and 71% in protected areas in restricted management categories (IUCN categories 1-4), which gives them greater legal protection, guaranteeing a robust structure of core areas in the CBC.

With the analysis of the demarcation by protected areas, compliance with indicators 1.5 and 1.2.1 of the "Strengthening the CBC" project was evaluated.

In relation to indicator 1.5 (*number of hectares of protected areas in the CBC demarcation that the project contributes to conserve*), the new approved demarcation (145,261 km^2 in 318 protected areas) incorporates 155 new protected areas in western Cuban territories, the east of Hispaniola, Puerto Rico and Jamaica. These new incorporated protected areas include a group that are fundamentally marine. The initial demarcation of the CBC in force from 2014 to the beginning of 2021 covered a total of 163 protected areas in eastern Cuba, all of Haiti and western Dominican Republic, the majority fundamentally land-based. Of these, 47 belong to Cuba, 24 to Haiti and 92 to the Dominican Republic. These protected areas covered an area of 25333 km^2; 5564 km^2 in Cuba, 4081 km^2 in Haiti and 15688 km^2 in the Dominican Republic. Considering this baseline, the new incorporated areas mean an increase of 119,928 km^2 of protected territories in the CBC demarcation, which represents an increase of 473% in relation to the previous demarcation, an increase much higher than initially expected by the project (50 %).

As for indicator 1.2.1 (*number of new coastal and marine areas identified*), the 2014 demarcation had a total of 53 marine and coastal protected areas, 19 in Cuba, 10 in Haiti and 24 in the Dominican Republic. The new approved demarcation now has a total of 169 marine and coastal protected areas covering 101,595 km^2. With this, a total of 116 new marine and coastal areas have been incorporated into the CBC demarcation, a value that is also much higher than the target planned for the project.

Table 4 shows the demarcation zones by priority type. We can see that the priority ecosystems that contribute the most to the proposed demarcation in terms of surface area are rainforests and pine forests, followed by forests and scrub land, coral reefs and, finally, mangrove swamps, which cover some 9,100 km^2. It should be considered that the values in the table add up to more than the area of the current demarcation, since there are areas that present several criteria for their inclusion and, consequently, they overlap.

The areas occupied by species subject to conservation that do not coincide with the above ecosystems cover over 18,500 km^2 and the complementary land connectivity areas cover 13,400 km^2. This compares to the complementary marine connectivity areas, which cover 101,843 km^2

(49% of the total demarcation). These areas mainly correspond to inclusion of the criterion under heading 2.2.2.1 *Inclusion of marine zones of importance as connectivity zones*, which are, therefore, largely in protected marine areas, with over half corresponding to just two protected marine areas in the Dominican Republic: Bancos de La Plata y La Navidad Marine Mammals Sanctuary and the Arrecifes del Sureste Marine Sanctuary, which account for 22.4% of the total demarcation. The other areas complementing connectivity are distributed in over 100 protected areas with only 12% outside protected areas.

*Table 1: Distribution of the demarcation by countries**

Zone/Country (km^2)	Cuba	Haiti	Dominican Republic	Puerto Rico	Jamaica	Total*
Core Areas	13912	1312	10605	954	1950	28732
% by country	48	5	37	3	7	100
Connectivity zones	34829	5828	53568	5323	12228	111777
% by country	31	5	47	5	11	99
Total	48741	7140	64173	6277	14178	140508
% of demarcation by country	34	5	45	4	10	99

* does not include figures for Navassa

Table 2: Land demarcation in relation to the size of the country

Zone/Country (km^2)	Cuba	%	Haiti	%	Dominican Republic	%	Puerto Rico	%	Jamaica	%	Total	% of demarcation*
Core Areas	8256	7.5	905	3.3	9169	18.8	355	3.9	1426	13.0	**20111**	**14.2**
Connectivity zones	13319	12.1	2962	10.7	7995	16.4	644	7.1	1684	15.3	26603	**18.7**
Total	**21575**	**19.6**	**3868**	**13.9**	**17164**	**35.3**	**999**	**11.0**	**3110**	**28.3**	**46714**	**32.9**

% of the surface area of the country. * Does not include figures for Navassa

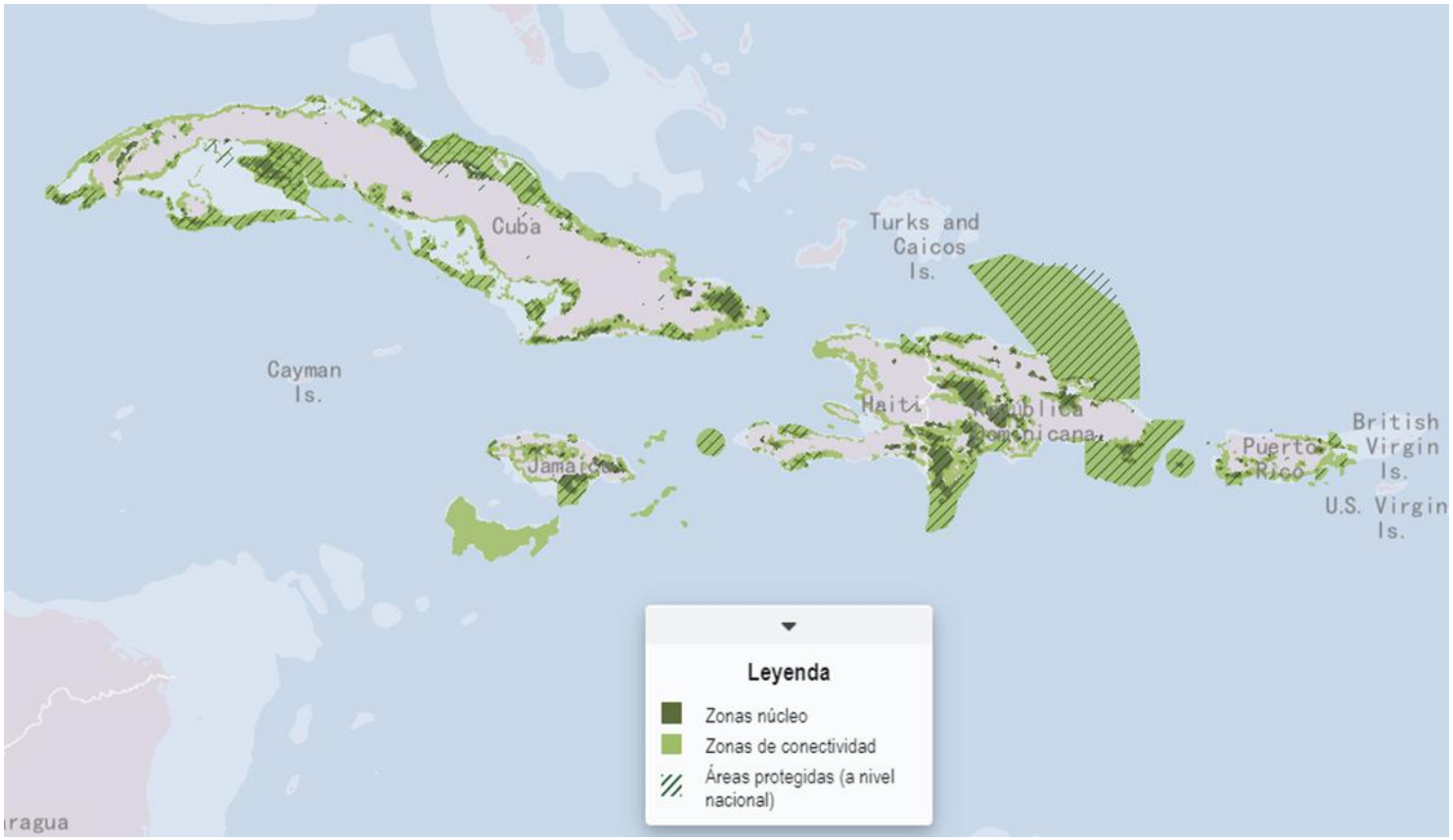
Table 3: Demarcation by protected areas and zones under IUCN categories

Zone/ UICN Category (km^2)	Cat I	Cat II	Cat III	Cat IV	Cat V	Cat VI	Fuera de AP	% en AP	% en Cat I a IV
Core Areas	774	21190	1235	4889	2341	6555	1223.4	96	71
Connectivity zones	32590	15624	704	19121	2539	9471	39390	65	52
Total	33364	36814	1939	24010	4880	16026	40613.2	71	56
% of the total Protected	32.9	36.3	1.9	23.7	4.8	15.8			

Table 4: Zones by priority type

CBC Zones	Coarse filter conservation targets				Fine filter conservtion targets and zones of importance for species & processes					Complementary zones for the corridor design				Total
	Moist forest & pinewoods	Dry forest & Shrublands	Mangrove forests	Coral reefs	Species	Zones of concentration of migratory birds	Bird nesting sites	Sea turtle nesting areas	Reef fish spawning sites	Areas for complementing land cores	Areas for complementing marine cores	Areas for complementing land connectivity	Areas for complementing marine connectivity	
Core areas	12387	6433	5907	4623	8392	872	84	105	420	857	354			40434
Connectivity zones	9926	8728	3201	8858	10167	2301	41	11	765			13428	101843	159269
Total	22313	15161	9108	13481	18559	3173	125	116	1185	857	354	13428	101843	199703

Map 1. New demarcation of the CBC (see details in https://bioatlas.cbcbio.org)



4. Final comments and next steps

As explained, the results presented here are part of a continuous planning cycle and should be reviewed in the coming years for their improvement and completion, in line with the provisions of the 2014 Inter-ministerial Agreement, which requires that the demarcation must periodically reviewed and adjusted (every three years). Therefore, once this new demarcation starts to be implemented, the effectiveness of its design could be assessed as information and tools improve, starting a new design stage. This will be particularly important for the marine environment, where less information was available for the analysis in this stage.