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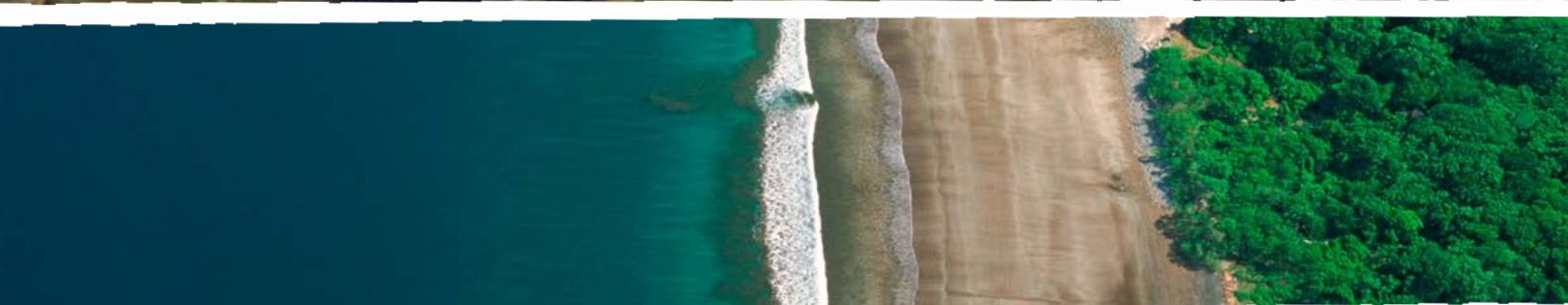
# LARGER THAN JAGUARS



Inputs for a strategic  
approach to biodiversity  
conservation in Latin America  
and the Caribbean



**REGION 1**  
**CENTRAL AMERICA**  
**AND THE CARIBBEAN**



International  
Partnerships



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Contact information:

Niclas Gottmann

European Commission

Directorate-General for International Partnerships

Rue de la Loi 41, 1000 Brussels, Belgium

Email: [Niclas.GOTTMANN@ec.europa.eu](mailto:Niclas.GOTTMANN@ec.europa.eu)

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# LARGER THAN JAGUARS

Inputs for a strategic  
approach to biodiversity  
conservation in Latin America  
and the Caribbean

**CENTRAL AMERICA AND  
THE CARIBBEAN (REGION 1)**

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## Editors

Van Houtte, Florence, European Commission  
Chatelus, Sébastien, European Commission  
Marijnissen, Chantal, European Commission  
Mayaux, Philippe, European Commission  
Saracco, Filippo, European Commission  
Villanueva Hullebroeck, Pablo, European Commission

|||||

## Authors

Gallo, Melibea, Chrysina Biodiversidad y Bienestar  
Arguedas, Stanley, AGRECO  
Merlot, Leon, AGRECO  
Vennetier, Claire, AGRECO

|||||

## Study supervision and support

Arguedas, Stanley, AGRECO  
Aveling, Conrad, AGRECO  
Herreros de Tejada, Fernando, Consultant  
Merlot, Leon, AGRECO  
Mill, Katharine, AGRECO  
Milner-Smith, Oliver, AGRECO  
Urioste, Alejandra, AGRECO  
Van Houtte, Florence, European Commission  
Vennetier, Claire, AGRECO  
Vives, Muriel, AGRECO  
White, Fiona, Consultant

|||||

## Spatial analysis and map production

Buzza, Karina, ProYungas  
Mayaux, Philippe, European Commission  
Villanueva Hullebroeck, Pablo, European Commission



## Contributors and participants

Alvarez, Adalberto, Friends of National Parks Association (AAPN)  
Armstrong Vaughn, Hyacinth, IUCN Barbados  
Borrero, Mónica, UNEP  
Camacho, Andrea, UNEP  
Degele, Pamela, Consultant  
Díazgranados, M. Claudia, Conservation International, Colombia  
Foster, Paul, Bijagual Ecological Reserve and University of Michigan, USA  
Gerhartz, Jose Luis, Secretariat of the Caribbean Biological Corridor  
González, Alexander, Tropical Scientific Center (CCT)  
Hasbún, Carlos Robert, Consultant  
Herrera, Alejandro, EcoMar Programme  
Herrera, Bernal, IUCN  
Homer, Floyd, Conservationist, Trinidad and Tobago  
Incháustegui, Sixto, Grupo Jaragua, Dominican Republic  
Lovell, Tricia, Ministry of Agriculture, Lands, Marine Resources & Agro Industry, Antigua and Barbuda  
Luy, Alejandro, Fundación Tierra Viva NGO and University of sLos Andes, Bogotá, Colombia  
Mohabir, Vidyanand, Environmental Protection Agency Guyana  
Morales, M. Eugenia, UNDP, Dominican Republic  
Novo, Isabel, Biologist, consultant and environmental educator, Venezuela  
Oltamari Arregui, Juan V., Consultant  
Pequero, Brígido, National Botanical Garden, Dominican Republic  
Radachowsky, Jeremy, WCS  
Ramos, Luis Antonio, USAID  
Ricord, Zulma, Consultant  
Rodríguez, Jon Paul, Venezuelan Institute of Scientific Research (IVIC); Provita  
Rosales, Augusto, Consultant  
Rubio de Urquia, Javier, Spanish National Parks Autonomous Agency (OAPN)  
Serrada Hierro, Jesús, Spanish National Parks Autonomous Agency (OAPN)  
Solis Rivera, Vivienne, CoopeSoliDar R.L.  
Tulsie, Bishnu, Saint Lucia National Trust  
Viña Dávila, Nicasio, Secretariat of the Caribbean Biological Corridor; Cuban Academy of Sciences  
Yerena, Edgard, Simón Bolívar University, Venezuela  
Zaldaña Lemus, Alfredo Alexander, FIAES



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# Acronyms

ABS	Access and Benefit Sharing	IPBES	Intergovernmental Scientific-Political Platform on Biodiversity and Ecosystem Services
ACS	Association of Caribbean States		
AFD	French Development Agency		
AZE	Alliance for Zero Extinction	IUCN	International Union for Conservation of Nature
BPM	Biodiversity Partnership Mesoamerica	KLC	key landscape for conservation
CABEI	Central American Bank for Economic Integration	LAC	Latin America and the Caribbean
		MARN	Ministry of Environment and natural resources
CAFTA	Central America Free Trade Agreement	MBC	Mesoamerican Biological Corridor
CANARI	Caribbean Natural Resources Institute	MSA	mean species abundance
CARICOM	Caribbean Community	NGO	non-governmental organisation
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza (Tropical Agricultural Research and Higher Education Centre)	NNP	natural national park
		NP	national park
		ODECA	Organisation of Central American States
CBC	Caribbean Biological Corridor Initiative	OECD	Organisation for Economic Co-operation and Development
CBD	Convention on Biological Diversity		
CBF	Caribbean Biodiversity Fund	OECM	other effective area-based conservation measures
CBI	Caribbean Basin Initiative		
CBM	Mesoamerican Biological Corridor	OTS	Organization for Tropical Studies
CC	climate change	PA	protected area
CCAD	Central American Commission on Environment and Development	PES	payment for ecosystem services
		PLAS	local sustainable development plan
CCCCC	Climate Change Centre for the Caribbean Community	PPSA	Payment for Environmental Services Programme (Costa Rica)
CEICOM	Centre for Research on Investment and Trade	REDD+	Reducing Emissions from Deforestation and forest Degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks
CEPF	Critical Ecosystem Partnership Fund		
CI	Conservation International	REDPARQUES	Latin American Technical Cooperation Network on National Parks, Other Protected Areas, Wild Flora and Fauna
CINPE - UNA	International Centre for Economic Policy for Sustainable Development of the National University of Costa Rica		
		REM	Special Management Regime (Colombia)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	SICA	Central American Integration System
		SIDS	Small Island Developing States
DANIDA	Danish International Cooperation Agency	TCO	Tierra Comunitaria de Origen (Original Community Land)
ECLAC	Economic Commission for Latin America and the Caribbean		
		TNC	The Nature Conservancy
ELAP	Latin American School of Protected Areas	UN/UNDP/UNEP	United Nations/Development Programme/Environment Programme
FAO	Food and Agriculture Organization of the United Nations		
		UNESCO	United Nations Educational Scientific and Cultural Organization
FARC	Revolutionary Armed Forces of Columbia		
FIAES	Fondo Iniciativa para las Américas El Salvador (Initiative for the Americas Fund El Salvador)	USAID	United States Agency for International Development
		UZACHI	Union of Zapoteco-Chinanteca Communities
FLEGT	Forest Law Enforcement, Governance and Trade		
		WB	World Bank
FPIC	free prior and informed consent	WCMC	World Conservation Monitoring Centre
GDP	gross domestic profit	WCS	Wildlife Conservation Society
GEF	Global Environment Facility	WDPA	World Database on Protected Areas
GIZ	German Agency for Technical Cooperation	WI	Wetlands International
HESP	Hydrological Environmental Services Programme (Mexico)	WWF	World Wide Fund for Nature
ICCA	indigenous and conserved communities area		
IDB	Inter-American Development Bank		
ILO	International Labour Organisation		







# #0

## Executive summary ►

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*Piñones beach, Loiza, Puerto Rico. The stunning beaches of Central America and the Caribbean are one of the main causes for the region becoming a prime destination for international tourism, and many countries' economies are largely reliant on the sector. Paradoxically, many beaches, like other coastal ecosystems, are threatened by urbanisation and the development of hotel infrastructure.*  
(Russell Kord/Alamy)



## #0 \_ Executive summary

**T**he scope of study of this report includes two subregions: Central America and the Caribbean. Central America comprises the 7 countries of Central America plus the southern states of Mexico. The Caribbean comprises 35 countries and territories to which, for this study, the Caribbean coast of Colombia and Venezuela have been added.

Six predominant biomes are identified in the region. The tropical and subtropical humid broad-leaved forest, which originally covered 47 % of the region, is one of the most biodiverse biomes in the world and has high levels of endemism in the Caribbean sector. Also represented are important extensions of tropical and subtropical dry broad-leaved forest (24 %), tropical and subtropical coniferous forest (15 %), deserts and xerophytic scrub (8 %), flooded grasslands and savannahs (4 %), and mangroves (0.4 %). These 6 biomes are considered as central elements of conservation within this document, along with the umbrella species.

Mesoamerica and the Caribbean islands are classified as global biodiversity hotspots because of their diversity and high level of endemism. The region has 70 ecoregions (8 % of the world's total), of which 12 are priorities for the conservation of the most outstanding and representative habitats of the planet's biodiversity.

The region is also culturally and socially very diverse, with an exceptionally rich multi-ethnic indigenous and Afro-descendant population. It is densely populated, especially in the Caribbean, and is going through a period of accelerated demographic, urban and economic growth. This brings new challenges for biodiversity conservation and the provision of ecosystem services to both rural and urban populations.

Despite regional economic growth, levels of social inequality have increased, particularly in Central America, between urban and rural areas. In addition, rural communities' livelihoods are often closely linked to the use of natural resources in their immediate environment, making them more vulnerable to environmental impacts and the effects of climate change. There are also growing levels of poverty among women. In this young region, the lack of employment, aggravated by natural disasters, is a major issue, as are high rates of violence and migration.

### Threats

The main pressures on biodiversity in the region are 1) the expansion of the agricultural frontier, generating deforestation (the annual rate of deforestation in Central America is the highest in Latin America and the Caribbean) and uncontrolled fires,

often as a result of bad agricultural practices; 2) urban expansion and the development of infrastructure for tourism; 3) species trafficking and the unsustainable use of biological resources, whether timber or certain species of plants and animals with high commercial value; 4) extractive industries, particularly mining; 5) introduction of invasive alien species, of particular concern in the Caribbean; and 6) expansion of salt and shrimp farms, mainly in mangrove areas. In addition to these threats, climate change is affecting the environment across the board and increasing the vulnerability of the region's population. In addition to the increase in the frequency and intensity of natural disasters, changes in water availability are of particular concern. Lastly, in Central America, the presence of criminal networks and land-grabbing processes (including of marine and coastal areas) are endangering indigenous peoples and other defenders of nature.

These pressures result largely from weaknesses in environmental governability and territorial governance systems. The lack of a clear legal framework and the weakness of the institutions in charge of environmental management favour the uncontrolled development of unsustainable or even illegal productive and extractive activities. A lack of adequate planning promotes a market-driven use of the territory and its ecosystem services, with productive and extractive activities that conflict with conservation efforts.

### Progress and limits

In the face of these pressures, efforts have been made to conserve biodiversity. One notable achievement in the Caribbean has been the increase in forest cover over the past two decades. To date, 28.2 % of Central America's land territory and 14.6 % of the land territory of the insular Caribbean correspond to protected areas (PAs). In the same regions, the marine area covered by PAs is 2.1 % and 1.2 %, respectively. However, there remain a series of challenges related to the representativeness of ecosystems under protection, PA management efficiency and resource availability.

Several major conservation programmes and projects active in the region take into account the need to work on a landscape scale, seeking greater transboundary and intersectoral collaboration. Among the most important are the Mesoamerican Biological Corridor (MBC), the Mesoamerican Integration and Development Project, the Caribbean Biological Corridor (CBC) and the Mesoamerican Biodiversity Alliance. The Central American Integration System (SICA) and the Caribbean Community (CARICOM) are the largest policy and strategy planning bodies with an impact at regional level. These programmes and bodies



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*Cattle in Coclé province, Panama. The expansion of pasture for livestock production has been one of the main drivers of deforestation in Central America in the last 20 years. Effective policies to discourage the expansion of cattle-ranching in forested areas and promote more sustainable agricultural models are urgently needed. (Oyvind Martinsen/Alamy)*

benefit from the support of various multilateral and bilateral partners, including the European Union. In addition, numerous environmental funds and non-governmental organisations (NGOs) (international, national and local) play an important role in fundraising for conservation, political advocacy and the implementation of environmental education activities, the co-management of PAs, and the promotion of environmentally friendly productive practices and technologies.

Experience from the region provides instructive lessons learned and promising approaches, with respect to 1) the importance of territorial planning under a landscape approach, connecting PAs and integrating them into a productive landscape; 2) the potential of local communities for the conservation and sustainable use of natural resources, through different shared management systems; 3) the importance of inclusive governance models; 4) the potential of economic valuation of ecosystem services to finance conservation; and 5) the need to integrate urban areas and city dwellers into conservation efforts at a landscape scale.

#### **Priority thematic areas**

In order to improve biodiversity conservation processes in the region, a strategic approach based on 6 thematic areas and a series of key landscapes for conservation (KLCs) is recommended, although independent, strategic priorities should ideally be addressed jointly, at the landscape scale and according to

specific local needs. The priority actions proposed under each thematic area are as follows:

#### **1. Conservation and restoration**

- Technical support for PA management: capacity building in planning, monitoring and control, law enforcement, sustainable use of natural resources, conflict management, equipment and others.
- Strengthening of national and regional PA systems: development of institutional regulatory framework, capacity building, network development and monitoring.
- Expand the protected area by extending the PAs or other effective area-based conservation measures (OECMs), in prioritised landscapes, with the criteria of ecological connectivity and protection of key sites (e.g. breeding sites).
- Improve PA governance systems towards greater participation, promotion of PA ownership and adherence to their conservation objectives by local stakeholders, i.e. communities established within or in the area of influence of the protected areas, authorities, civil society organisations, private companies, etc.
- Develop sustainable financing mechanisms for PA management and landscape restoration including, if possible, mechanisms to ensure a contribution from beneficiaries (payment for ecosystem services mechanisms) or from those responsible for degradation (e.g., providing environmental safeguards in the regulatory framework).





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*Fishermen, Albaricque, Grand Anse, Haiti. Fisheries, whether large-scale, artisanal or for sport, are important for coastal economies and food security. Adopting good fishing practices in a regulated and controlled framework helps to minimise their impact. Without this, overfishing and the use of inappropriate technologies can threaten the very sustainability of these activities. (Patrice Pat/Alamy)*

- Generate quality information to feed the planning, follow-up and monitoring processes of landscape conservation, restoration programmes and PAs.
  - Encourage intergovernmental dialogue and coordination for the design and/or strengthening of regional conservation initiatives under the landscape approach (CBC, MBC, etc.), including the consolidation of the PA network and the restoration of priority ecosystems, within the framework of the REDD+ (Reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks) strategy if applicable.
  - Prepare specific plans or programmes for the conservation of umbrella species.
  - Strengthen national, regional and international strategies to combat wildlife trafficking.
  - Design and implement comprehensive plans for the control, eradication and prevention of the entry of exotic species, pests and diseases that critically affect the region's ecosystems, and strengthen intraregional collaboration in this area.
  - Strengthen initiatives and regional collaboration on the prevention, detection and fighting of, and recovery from, forest fires and natural disasters.
  - Articulate efforts between public bodies, academia, NGOs, companies and producers to ensure that practices are compatible with the ecosystem and biodiversity conservation objectives proposed at the landscape level.
  - Create and/or strengthen national and global platforms for sustainable production, seeking massive participation of the primary productive sector.
  - Develop marketing tools for sustainable ventures (market openings, trade linkages, certification, green labels, designation of origin, etc.) and adapted financial instruments. Sustainable public procurement policies can boost these ventures considerably.
  - Strengthen the reliability of good practice certification systems (verification mechanisms, coverage of criteria, particularly in terms of biodiversity conservation, respect for human rights, etc.)
  - Enshrine in environmental legislation the recognition of the rights of rural communities (indigenous, peasant, Afro-descendant and others).
  - Promote the maintenance, registration and sharing of traditional knowledge on indigenous production systems and the conservation of genetic materials of native plants of high food importance, medicinal plants and phytotherapy.
  - Control illegal or unsustainable activities; suspend economic incentives for unsustainable activities and implement incentives for the adoption of good practices.
  - Coordinate intersectoral dialogue to promote an integrated approach in which policies for agricultural, forestry and tourism development, water management, biodiversity conservation and climate change mitigation are made compatible.
- ## 2. Sustainable production
- Include clauses that encourage sustainable production in international trade agreements.
  - Improve the awareness of consumers and tourists, and promote responsible consumption (see thematic area 5).
  - Develop standards and guidelines of good practices for the productive and tourism sectors, taking into account a gender approach, and promote their application.



### 3. Environmental management in urban and peri-urban environments

- Draw up inventories and evaluate the state of conservation of urban and peri-urban natural spaces.
- Strengthen urban and peri-urban PAs.
- Develop and implement municipal policies for conservation and ecosystem management, including measures to minimise boundary issues and conflicts between urban areas and PAs and nearby natural landscapes.
- Identify the ecosystem services provided, and estimate their value and the actual costs of implementing measures to ensure their sustainability.
- Design and implement financing mechanisms for municipal environmental funds (payment for ecosystem services, corporate social and environmental responsibility, voluntary contributions).
- Design and implement education and communication strategies to strengthen environmental awareness among the urban population.

### 4. Environmental governance

- Promote governance systems that encourage collaboration between different sectors and levels of the state, in addition to the private sector, and safeguard the rights of local actors, taking into account the lessons of the Forest Law Enforcement, Governance and Trade (FLEGT) policy applied in the Honduran forest sector.
- Strengthen cross-border and regional coordination mechanisms related to environmental management, e.g. within the framework of SICA, the MBC and CBC).
- Promote the application of inclusive models of PA governance (e.g. management committees), through appropriate legal frameworks, training and specific budget allocations. These should take into consideration agreements between environmental authorities and communities for the sustainable use of natural resources within PAs.
- Promote clarity and equity in the legal framework for land, water and forest resource tenure and use, as well as its effective implementation and control, in order to improve management sustainability and to reduce conflicts.
- Strengthen the territorial management capacities of sub-national governments and other management and control bodies at the sub-regional level in order to make effective the implementation of conservation policies.
- Strengthen the organisational, lobbying and management capacities of relevant civil society organisations, using a multicultural and gender approach, in order to promote citizen participation and control in environmental matters (e.g. citizen councils).
- Establish efficient systems for the early detection and resolution of conflicts, which also respond to the need for improvements in the security conditions of environmental defenders.
- Strengthen the capacities of judicial systems to deal with environmental crimes. Promote coordination with security institutions where conservation objectives conflict with criminal or other interests.

- Strengthen the territorial management capacities of local organisations, especially indigenous groups in collective territories, and guarantee the application of the International Labour Organisation (ILO) Convention 169, particularly with regard to free, prior and informed consent. It is important to integrate rural communities into territorial management beyond their own territories.
- Improve transparent access to information for all stakeholders, including by promoting the signing, dissemination and implementation of the Escazú Agreement (Regional Agreement on Access to Information, Public Participation and Access to Justice in Environmental Matters in Latin America and the Caribbean).

### 5. Knowledge management and awareness

- Promote the research and production of information (traditional and scientific sources) at the regional level, and establish and/or strengthen mechanisms for sharing this at the same level, e.g. socio-environmental observatories, in order to encourage and facilitate decision-making at the supranational level.
- Implement communication, information and environmental awareness strategies, aimed at decision-makers from all sectors and levels of the state, the private sector, consumers, academia and civil society in general, particularly young people.
- Promote training programmes on the effective management of land and biodiversity, particularly for public administrations at a sub-national level and for institutions in charge of supervising the application of environmental regulations, PA managers and local actors involved in co-management mechanisms, and those studying for careers related to land use.

### 6. Public policies and environmental planning

- Promote participatory land-management processes and their integration at different scales (including cross-border), taking into account biological connectivity needs, in coordination with legislative bodies and authorities in charge of development and conservation policies.
- Encourage the adoption or strengthening of environmental safeguards in development projects, before international bodies (e.g. SICA) and national and sub-national authorities.
- Promote and/or strengthen the application of sustainable conservation financing mechanisms in the KLCs (environmental fiscal reform, payment for ecosystem services, sustainable public procurement and others), including emergency funds.
- Favour nature-based solutions for climate change mitigation and adaptation, to ensure co-benefits for biodiversity and the communities that depend on it.
- Strengthen environmental control and monitoring mechanisms to guarantee adequate implementation of the various public policies and respect for relevant legislation.



# #1

## Introduction and main characteristics ►

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*The quetzal (Pharomachrus mocinno), a sacred bird for Mayan civilizations, is endemic to Mesoamerica and lives mainly in cloud and montane forests. Its populations are declining, mainly due to the loss, degradation and fragmentation of its habitat. Significant efforts are underway to save it, including the creation of the Biotopo del Quetzal protected area and the Cloud Forest Biological Corridor in Guatemala.*  
(Ondrej Prosicky/ Shutterstock)



## #1 \_ Introduction and main characteristics

United by history, shared values and cultural ties, the European Union (EU) and Latin America and the Caribbean (LAC) have a lasting and productive relationship. Countries in the two regions have long worked closely together at an international level, particularly in the framework of the Rio Convention and in defining the Paris Agreement and the Sustainable Development Goals of the 2030 Agenda.

For some time now, the EU has become the main development cooperation partner and the largest provider of humanitarian aid in LAC, with a commitment that also seeks to respond to the region's major environmental challenges. The joint communication, 'European Union, Latin America and the Caribbean: Joining forces for a common future' (16 April 2019)<sup>1</sup>, makes the environment a priority issue. It is widely recognised that the sustainable management and use of ecosystems and natural resources play a fundamental role in peace, development and conflict resolution.

The European Green Deal<sup>2</sup> acknowledges the scale of challenges posed by climate change and environmental degradation to the world's economy and societies. It sets out an ambitious EU response,

with a roadmap proposing a range of measures to boost resource efficiency (through a shift to a clean and circular economy), as well as to halt climate change, reverse biodiversity loss and reduce pollution. The EU calls on its external partners, including LAC countries, to establish green alliances to join forces for this global transformation agenda.

One of the first deliverables of the Green Deal is the new EU Biodiversity Strategy 2020-2030, aimed at stepping up action to prevent further biodiversity loss and restore ecosystems. The strategy also sets the pathway of EU aims for the new Global Strategic Framework for Biodiversity under the Convention on Biological Diversity (CBD).

The renewed sense of urgency regarding the challenges related to biodiversity loss is particularly significant for LAC. While the region is home to more than 50 % of the world's biodiversity, 6 of the 17 megadiverse countries and half of the world's tropical forests, the accelerated degradation of its ecosystems and wildlife is threatening the very foundations of sustainable development, raising global concerns.

<sup>(1)</sup> <https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:52019JC0006&from=ES>

<sup>(2)</sup> [https://ec.europa.eu/info/sites/info/files/european-green-deal-communication\\_en.pdf](https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf)



**FIGURE 1** Central American and Caribbean subregions (defined for the purposes of this report)



Source: own elaboration

*Larger than Jaguars* proposes a series of strategic directions for the conservation and sustainable use of biodiversity in LAC. It is organised into five distinct regions. This document presents the strategy for the Central America and Caribbean region, as part of a comprehensive study that includes four other regional volumes and one synthesis volume covering the whole of LAC, which are published separately as stand-alone documents.

It is designed as a decision-support tool to guide investments and activities in the region of governments, the private sector and civil society as well as of the EU and other international partners. Its purpose is to help identify priorities and enable better coordination of biodiversity programmes and policies. It describes the key characteristics of the region and the main threats to its ecosystems, wildlife and the ecosystem services they provide to people. It also compiles lessons learned from past and present actions and highlights the most promising approaches.

It proposes six thematic areas and a series of key landscapes for conservation (KLCs). The focus is mainly on the regional level, but actions are also promoted to address challenges that require a global response, such as wildlife trafficking, illegal logging and the associated trade, etc. Special attention is given to rural and indigenous populations living near biodiversity-rich areas, with the objective of ensuring the maintenance of their livelihoods through

sustainable management of natural resources. A fundamental prerequisite for achieving these objectives is to strengthen, at national and international level, the interest, awareness and capacities of civil society in biodiversity and ecosystem conservation, through appropriate communication and education.

The study has been carried out in the framework of the EU's Biodiversity for Life (B4Life) initiative, which aims to contribute to the conservation of biodiversity at the global level with a particular focus on the implementation of the Convention on Biological Diversity. It focuses on strengthening the following strategic areas:

- Preserving functional ecosystems to ensure food security and sustainable development.
- Strengthening appropriate governance mechanisms for the sustainable management of natural capital.
- Developing proposals based on natural solutions to orient development processes towards a green economy.
- Contributing to the implementation of measures aimed at eliminating illegal trafficking of species.

The report focuses on terrestrial and freshwater ecosystems. Coastal and especially marine ecosystems are not addressed in detail. This decision regarding the geographical scope of the study does not imply that these are less important.





## 1.1 KEY BIODIVERSITY FEATURES

The region covered by this document comprises the 7 countries of Central America, the southern states of Mexico, the 35 countries and territories of the insular Caribbean, and the Caribbean coasts of Colombia and Venezuela. Due to its diverse socio-economic, environmental and cultural characteristics, it has been divided into two subregions for the purposes of this study: 1) Central America and 2) the Caribbean. The main criterion used to determine its boundary is the grouping of contiguous biomes.

The region includes 6 biomes.<sup>3</sup> The most extensive is the tropical and subtropical humid broad-leaved forest, which originally covered 47 % of the region. Important extensions of tropical and subtropical dry broad-leaved forest (24 %), and tropical and subtropical coniferous forest (15 %) are also represented, as well as xerophilic deserts and shrublands (8 %), flooded grassland and savannah (4 %), and mangroves (0.4 %).

Despite covering only 1 % of the earth's surface, the region has

70 eco-regions (8 % of ecoregions worldwide). Twelve of these have been identified as priorities for the conservation of the most outstanding and representative habitats of biodiversity.<sup>4</sup> In fact, both Central America and the Caribbean islands are classified as biodiversity hotspots at the global level. The Caribbean coasts of Colombia and Venezuela have an important biodiversity, particularly in terms of species adapted to the climatic conditions of dry forests, xerophytic scrub and deserts that prevail in this part of the region.

### Central America biodiversity hotspot<sup>5,6</sup>

Central America contains between 7 and 10 % of all known life forms and 17 % of the world's terrestrial species, despite covering only 0.5 % of the land mass. It ranks second in terms of species diversity in relation to the 25 hotspots identified worldwide, surpassed only by the Tropical Andes. In terms of endemism, it ranks first for mammals and second for amphibians, reptiles and birds. Of the 17 000 vascular plant species reported for this hotspot, 3 000 are endemic. It is home to more than 300 species of cactus, and provides a habitat for some 1 120 species of birds, of which 200 are endemic to the region. In

<sup>(3)</sup> Olson D., E. Dinerstein, E. Wikramanayake, N. Burgess, G. Powell, E. Underwood, J. D'Amico, Y. Itoua, H. Strand, J. Morrison, C. Loucks, T. Allnutt, T. Ricketts, Y. Kura, J. Lamoreux, W. Wettengel, P. Hedao and K. Kassem (2001) Terrestrial Ecoregions of the World: A New Map of Life on Earth. *BioScience* 51(11), pp. 933-938.

<sup>(4)</sup> Olson D. M. and E. Dinerstein (2002). The Global 200: Priority ecoregions for global conservation. *Annals of the Missouri Botanical Garden* 89(2), pp. 199-224.

<sup>(5)</sup> Critical Ecosystem Partnership Fund (2001). Ecosystem Profile: Southern Region of the Mesoamerican Biodiversity Hotspot: Nicaragua, Costa Rica, Panama.

<sup>(6)</sup> Critical Ecosystem Partnership Fund (2005). Mesoamerica Hotspot: Northern Mesoamerica. Critical Ecosystem Partnership Fund.

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*Puerto Rican tody (Todus mexicanus). The insularity of the Caribbean has favoured separate evolutionary processes on each island, leading to a very high number of species and endemism in the region. The Todus genus is endemic to the Greater Antilles. Cuba, Puerto Rico and Jamaica each have one species, while the island of Hispaniola has two. (© Gregoire Dubois)*

addition, it is on the flyway of 225 migratory species; three of the four Western Hemisphere flyways converge in this subregion.

This rich biodiversity is partly attributable to its geographical position at the juncture of two major biogeographical fields: the Nearctic and the neotropics. These came together 5 million years ago, when parts of Central America rose above sea level, creating a land bridge between North and South America. In addition, the varied topography enabled the development of unique species, resulting in a high endemism of both fauna and flora.

#### **Caribbean islands biodiversity hotspot<sup>7</sup>**

The Caribbean islands stand out for their high rate of endemism, attributable to the combination of a geologically complex history, rugged topography and/or insularity, which have led to the isolation of populations and speciation processes. They provide the habitat for nearly 11 000 plant species, 72 % of them endemic. In the case of vertebrates, high proportions of endemic species characterise the herpetofauna (100 % of the 189 amphibian species and 95 % of the 520 species of reptiles), probably due to their low dispersal rates, in contrast to birds (26 % of 564 species) and mammals (74 % of 69 species, most of which are bats), which are more mobile.

This hotspot is also the heart of Atlantic biodiversity. Its 10 000 km<sup>2</sup> of reefs, 22 000 km<sup>2</sup> of mangroves and 33 000 km<sup>2</sup> of seagrass beds are home to a high diversity of marine species as well as key fish spawning areas. These are essential to the fishing sector and more broadly to the livelihoods of large sections of coastal and island populations.

Freshwater reserves (including lowland and mountain rivers, lakes, wetlands, marshes and underground karst networks) provide a habitat for many species. In addition, they are key to providing water and other services to local communities.

## **1.2 SOCIO-ECONOMIC ASPECTS**

### **Population growth**

The region is home to more than 100 million people, and is experiencing rapid population growth. Population density is already high, averaging 84 inhabitants per square kilometre in Central America and 180 inhabitants per square kilometre in the Caribbean<sup>8</sup>, with extreme densities on some islands (over 1 000 inhabitants/km<sup>2</sup> on Saint Martin). Approximately 60 % of the population is urban, and this proportion is increasing due to rural exodus. On certain islands, seasonal tourist peaks locally represent a significant burden on natural resources.

This population dynamic is generating a greater demand for food, resources such as water, employment, housing, energy and basic services. It implies new challenges for biodiversity conservation and the provision of ecosystem services.

### **Economic growth and regional integration**

The region's economies are, on average, structured as follows: 10 % of production in the primary or extractive sector, 25 % in the secondary sector or industry and 65 % in the tertiary or service sector. Between 2000 and 2013, economic activities continued a trend to concentrate in the services sector, which attracts most foreign investment. Mining also plays an increasingly important role and places significant pressure on biodiversity. Even so, compared with South America (where extractive activities are a major sector), the region exports a greater diversity of goods and services, with the United States of America being its main trading partner.

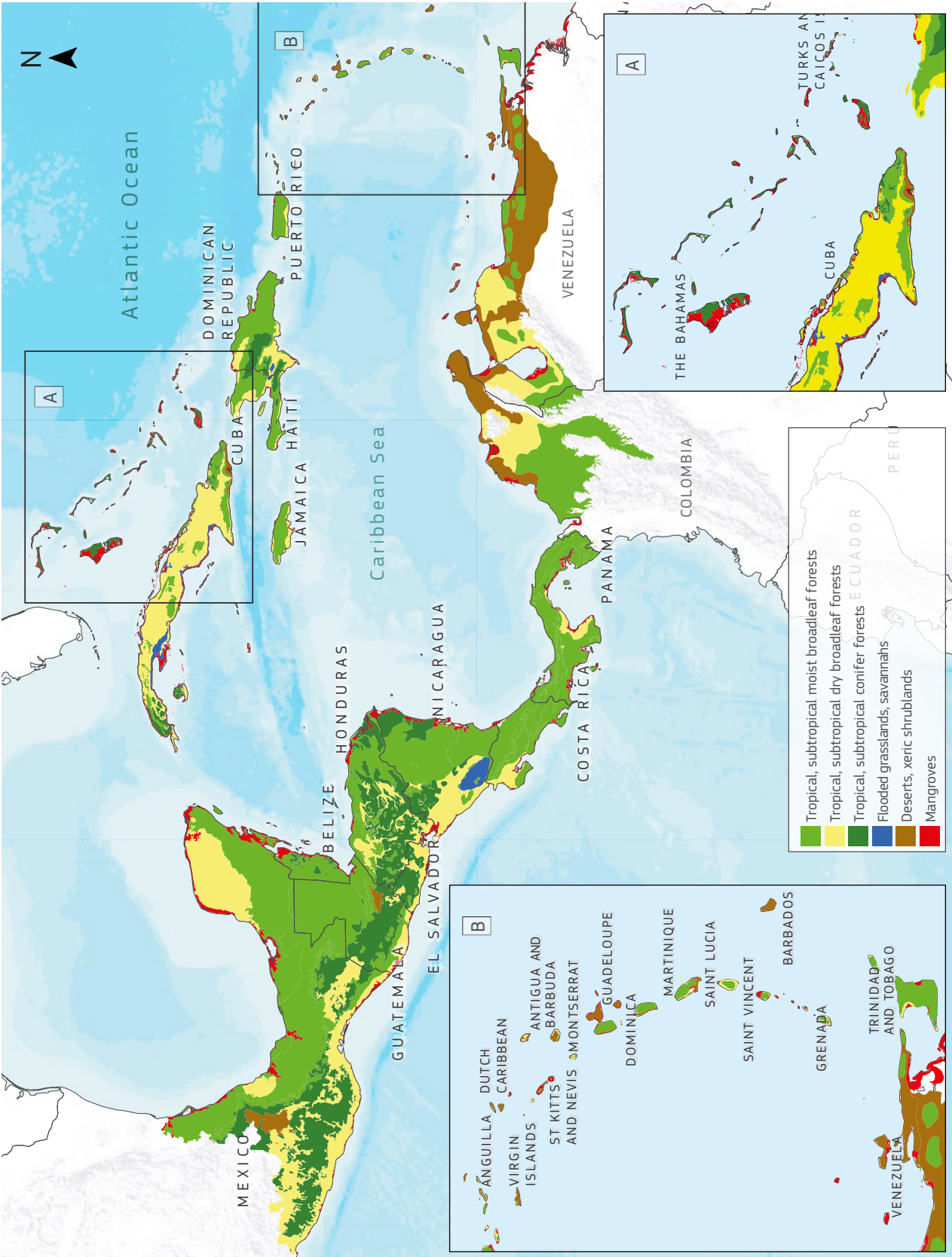
The expansion of the Panama Canal is stimulating investment in logistics facilities and ports in Central America, as well as in the Caribbean<sup>9</sup>. Other infrastructure is also being developed and regulatory frameworks formalised to enhance Central American and Caribbean integration (trade, energy, etc.).

<sup>(7)</sup> Critical Ecosystem Partnership Fund (2010). Ecosystem profile: Caribbean Islands Biodiversity Hotspot. BirdLife International.

<sup>(8)</sup> World Bank database (2016). Available at <http://datos.bancomundial.org/indicador>

<sup>(9)</sup> ECLAC (2015a). Foreign Direct Investment in Latin America and the Caribbean (LC/G.2641-P), Santiago, Chile.

**FIGURE 2** Biomes present in Central America and the Caribbean (potential biome cover without human footprint)



Source: Olson D. et al. (2001). *Terrestrial Ecoregions of the World: A New Map of Life on Earth*. *BioScience*. 51. 933-938

An economic slowdown in the region over the last decade, partly as a result of the weakening of the world economy, has been unfavourable for the region internationally<sup>10</sup>. The preliminary balance of the Economic Commission for Latin America and the Caribbean (ECLAC) for 2019 indicates a growth of 2.4 % for Central America and 1.4 % for the Caribbean<sup>11</sup>, although these averages conceal a wide diversity in fortunes, with some countries experiencing sustained high growth (e.g. Dominican Republic, Dominica and Antigua and Barbuda) while others are in recession in a context of deep socio-political crisis (e.g. Venezuela, Nicaragua and Haiti).

For several countries, civil wars and armed conflicts since the 1980s have obstructed their economic development. In addition, natural disasters (floods, hurricanes, volcanic eruptions and earthquakes) regularly impact the region's economies.

Among the countries of the region are several small island developing states (SIDS), which were recognised as a distinct group of countries with specific development constraints at the United Nations Conference on Development and Environment in Rio de Janeiro (June 1992). In the Caribbean, these include 16 independent states, plus 14 islands linked to European countries or the USA<sup>12</sup>. Their specific features (small size, remoteness, limited resource and export product base, etc.) make them highly vulnerable to external economic shocks, as well as to global environmental problems. They are particularly affected by the effects of climate change and natural disasters: the average annual cost of natural disasters is equivalent to 13 % of SIDS' gross domestic product (GDP), compared to less than 1 % for other countries in the world<sup>13</sup>.

### Poverty, inequality, violence and migration

Despite regional economic growth, poverty rates have not significantly fallen over the last decade and have increased in some countries. More than half the population in Honduras, Guatemala and Nicaragua live in poverty, as do approximately 25 % of people in the Caribbean. With the exception of Costa Rica (which has the lowest level of undernourishment in the region), all Central American countries reduced their prevalence of undernourishment from 1990 to 2015. However, some still have among the highest levels of undernourishment in Latin

America and the Caribbean (LAC)<sup>14</sup>. In some Caribbean and coastal countries, such as Venezuela and Haiti, food security indices have been worsening again in recent years.

Levels of social inequality have increased: a Central American in the richest decile earns between 20 and 70 times more than one in the poorest decile. The gap is significant between urban and rural areas, particularly in Guatemala, Nicaragua and Panama<sup>15</sup>. In addition, rural communities are often highly dependent on natural resources for their livelihoods (e.g. Caribbean coastal communities engaged in fishing and aquaculture<sup>16</sup>), which makes them more vulnerable to environmental impacts and the effects of climate change. There is also a widening gap in poverty between women and men, associated with a discriminatory division of labour and organisation of care tasks<sup>17</sup>.

In this young region, a lack of employment, aggravated by natural disasters, as well as high rates of violence, are major problems. Faced with this situation, about 250 000 Central Americans migrate from their countries every year, mainly to the USA. In many countries of the region, family remittances sent by migrants are an important part of the economy, and are increasing. They represented 7.5 % of the total GDP of Central America in 2016 and up to 20 % of the GDP in El Salvador and Honduras in 2018<sup>18,19</sup>.

### Land tenure and the agricultural sector

Historically, since colonial times, agriculture has been a major economic activity. In the insular Caribbean in particular, coffee and sugar cane plantations have expanded since the 16<sup>th</sup> century. Where most of the land belonged to a few landowners, the poorer populations, in order to survive, have resorted to exploiting natural resources through, for example, artisanal fishing or various forest-related activities<sup>20</sup>.

Today, the land tenure structure in Central America and parts of the Caribbean remains among the most unequal in the world. Although agrarian reforms have improved access to land in some cases, most peasants still work small patches of land, enabling only basic subsistence. A poorly maintained rural cadastre and unequal access to information limit access to land by the poorest populations<sup>21</sup>. In areas where the rule of law is

<sup>(10)</sup> ECLAC (2019a). Economic Survey of Latin America and the Caribbean, 2019. Santiago. Available at: <https://www.cepal.org/es/publicaciones/44674-estudio-economico-america-latina-caribe-2019-nuevo-contexto-financiero-mundial>

<sup>(11)</sup> ECLAC (2019b). Preliminary Overview of the Economies of Latin America and the Caribbean 2019. 155 pp. Available at: <https://www.cepal.org/es/publicaciones/45000-balance-preliminar-economias-america-latina-caribe-2019>

<sup>(12)</sup> A list of SIDS is available at <https://sustainabledevelopment.un.org/topics/sids/list>

<sup>(13)</sup> UN Office of High Representative for Least Developed Countries, Landlocked Developing Countries & Small Island Developing States (OHRLLS) (2017). SIDS in numbers: Biodiversity and oceans.

<sup>(14)</sup> FAO (2014). Panorama of Food and Nutritional Security in Central America and the Dominican Republic. Panama City. 80 pp.

<sup>(15)</sup> CEPALSTAT [online database]: <http://estadisticas.cepal.org/cepalstat/portada.html>

<sup>(16)</sup> Critical Ecosystem Partnership Fund (2010). Op cit.

<sup>(17)</sup> See ECLAC's Gender Equality Observatory for Latin America and the Caribbean [online database] <https://oig.cepal.org/es>

<sup>(18)</sup> ECLAC (2018). Atlas of Migration in the Countries of Northern Central America. Santiago. Available at: <https://repositorio.cepal.org/bitstream/handle/11362/44292/1/S1801072-es.pdf>

<sup>(19)</sup> ECLAC (2019c). Economic Survey of Central America and the Dominican Republic in 2018 and outlook for 2019, July 2019, Mexico City.

<sup>(20)</sup> IUCN (2013). Regional situation analysis: an updated perspective. Towards an efficient and effective 2013-2016 programme in Central America and the Caribbean. San José, Costa Rica: International Union for Conservation of Nature.

<sup>(21)</sup> FAO (2010). Governance of land tenure and natural resources in Central America. Working paper on land tenure. pp. 18-55.



weak, indigenous people are expelled from their land and violence is used to control territory.

In areas where land is desirable to agro-industry, tourism or urban development, there has been an increase in large-scale land purchases and prices are rising. This has led to the displacement of small-scale agriculture towards marginal lands (e.g. mountain slopes), at the cost of natural ecosystems. Some small producers who find themselves struggling to compete in agricultural markets sell their land in order to migrate and/or invest in other types of business. This leads to a new process of land concentration.

In more marginal rural areas, investment in more profitable and adapted production systems is almost non-existent. Poverty prevails and the population is ageing due to the migration of young people towards urban centres or abroad in search of work. Although in times of crisis subsistence agriculture can be an option for returning migrants or the urban unemployed, these people often lack knowledge in farming techniques and have little awareness of their impacts on their environment.

Such phenomena undermine the sustainability of small-scale agriculture and local food production, and may even affect a country's food security. This is already the case in most Caribbean islands, where total and per capita agricultural production has declined, mainly due to the use of land for tourism and urban development.

### Cultural diversity

The region retains an exceptional indigenous and Afro-descendant multi-ethnic richness, as well as a diversity of European and Asian descendants. Cultural diversity is perhaps the most important element of social resilience in the subregion. Ancestral forms of organisation, customary rules and traditional languages still exist and can be an advantage for the generation of knowledge on sustainable use and conservation.

Central America is home to more than 80 different indigenous peoples, representing about 20 % of the total population, with a different proportion depending on the country. They are present in approximately 282 000 km<sup>2</sup>, in territories that cover more than half of the forests and many of the waterways in the sub-region<sup>22</sup>. This gives them an important role in the management of ecosystems in the subregion. In this sense, the struggle for

greater recognition of their ancestral territories is justified both socially and environmentally. A similar situation can be observed on the Caribbean coast of Colombia and Venezuela. On the Caribbean islands, however, there are few indigenous communities and most of the population is of African descent.

The advance of the agricultural frontier, the privatisation of collective lands, the allocation of plots to the ex-combatants of armed conflicts (such as in Colombia since the peace agreement) and the exploitation of natural resources by private or parastatal companies (legally and illegally) are all vectors of conflict with local communities, and in particular with indigenous peoples. They put at risk the control of their ancestral territories, their access to resources, as well as their food security and traditional forms of governance<sup>23</sup>. In the face of these threats, many indigenous peoples have organised themselves in recent decades to defend their rights. In Nicaragua and Honduras, for example, they have successfully negotiated with their governments the collective titling of some of their territories. In several countries, regimes of political autonomy have been created for certain regions with high indigenous populations. However, there are still major gaps in the implementation and recognition of indigenous peoples' territorial rights (the right to free, prior and informed consent, among others)<sup>24</sup>.

### Tourism

The World Travel and Tourism Council ranks the Caribbean as the most tourism-dependent area in the world. By 2012 the sector already accounted for 25 % of foreign exchange earnings, 20 % of jobs and 25-35 % of the economy<sup>25</sup>, and its growth continues. On some islands, tourism expenditure generates about half of the GDP, such as Anguilla (53 % in 2017), Antigua and Barbuda (50.8 %) and Saint Lucia (46.8 %)<sup>26</sup>. Even the population changes significantly during the year on many small islands, such as Saint Martin, Cayman Islands, Aruba, Bahamas and Barbados, due to seasonal tourist arrivals. In Central America, tourism is also on the rise. In 2013 it already generated 4.7 % of the regional GDP. This is high compared with the global average share of GDP for the sector: 1.6 % worldwide; 1.2 % in LAC countries<sup>27</sup>.

In 2018, tourism service revenues represented 60 % of total service exports in Central America and over 70 % in the Caribbean<sup>28</sup>.

(<sup>22</sup>) IUCN (2016). New map shows how the indigenous peoples of Central America occupy and protect a large number of forests, rivers and coastal waters. Available at [https://www.iucn.org/es/sobre/union/secretaria/oficinas/mesoamerica\\_y\\_caribe/?22732/Nuevo-mapa-muestra-como-los-pueblos-indigenas-de-Centroamerica-ocupan-y-resguardan-gran-cantidad-de-bosques-rios-y-aguas-costeras](https://www.iucn.org/es/sobre/union/secretaria/oficinas/mesoamerica_y_caribe/?22732/Nuevo-mapa-muestra-como-los-pueblos-indigenas-de-Centroamerica-ocupan-y-resguardan-gran-cantidad-de-bosques-rios-y-aguas-costeras)

(<sup>23</sup>) FAO (2010). Op cit.

(<sup>24</sup>) ECLAC (2014). Indigenous peoples in Latin America. Progress in the last decade and pending challenges to guarantee their rights. Summary. Santiago, Chile. Available at: [https://repositorio.cepal.org/bitstream/handle/11362/37050/4/S1420783\\_es.pdf](https://repositorio.cepal.org/bitstream/handle/11362/37050/4/S1420783_es.pdf)

(<sup>25</sup>) UNDP (2012). Caribbean Human Development Report 2012. United Nations Development Programme.

(<sup>26</sup>) According to the ECLAC database (<https://cepalstat-prod.cepal.org/cepalstat/Portada.html>), based on data from the World Tourism Organisation.

(<sup>27</sup>) State of the Nation Programme (2015). State of the Region: Fifth Report. Poverty in Central America: Evolution 2000-2014 and current situation. San José, Costa Rica: State of the Nation Programme – State of the Region. PEN-ERCA.

(<sup>28</sup>) ECLAC (2019a). Economic Survey of Latin America and the Caribbean, 2019. Santiago. Available at: <https://www.cepal.org/es/publicaciones/44674-estudio-economico-america-latina-caribe-2019-nuevo-contexto-financiero-mundial>





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*A protest by indigenous communities against the opening of an open-pit gold mine in Copán Ruinas, Honduras, April 2016. The exploitation of natural resources by private or parastatal companies (legally and illegally) can lead to conflict with local populations. (Matyas Rehak/Alamy Stock Photo)*

Although tourism represents a great development alternative, it also puts pressure on biodiversity, which must be taken into account in development and conservation planning.

### Energy sources

Fossil fuels are the largest source of final energy for countries of the region<sup>29</sup>. Even so, their CO<sub>2</sub> emissions are below most developed countries, with an average of 2.13 tons per capita<sup>30</sup>. With the exception of Venezuela, Mexico, Trinidad and Tobago and Colombia, the countries are energy-dependent<sup>31</sup>. Many have seen the need to limit their dependence on hydrocarbons, particularly in the Caribbean islands, where 90 % of all energy used is derived from imported oil<sup>32</sup>.

In recent years, there has been progress in replacing fossil fuels with renewables, particularly in Central American countries and mainly using foreign capital investments. Hydroelectric power is the most widely used renewable resource, followed by wind and geothermal energy, and finally solar power. Costa Rica and Colombia are leaders in the integration of renewable energies in their electricity mix.<sup>33</sup>

Despite these advances in alternative energy, wood and charcoal remain prominent sources of primary energy, particularly in Nicaragua, Honduras, Guatemala and Haiti. This is one of the important pressures on biodiversity that must be addressed in conjunction with other conservation strategies.

## 1.3 CENTRAL ELEMENTS FOR CONSERVATION

Central elements have been identified from which to prioritise conservation and/or restoration actions. These are mainly parts of the region's large biomes or types of ecosystems, chosen according to the degree of threat to which they are subject, their integrity and irreplaceability, but also the importance of the ecosystem services they provide, among other criteria.

The last central element groups together a series of 'umbrella species', whose protection implies the preservation of large natural spaces and contributes, indirectly, to the conservation of the other species that they 'shelter'.

### 1.3.1 Large forest masses

The region's forests, whether humid, dry or coniferous, fulfil a number of important ecosystem functions. They contribute to the regulation of the water cycle, erosion control, bank stabilisation and climate regulation. At higher altitudes, they contribute to the protection of river headwaters and recharge areas. They are the habitat of countless endemic and/or commercially valuable species, among which are the wild relatives of several of the region's main crops (corn, beans, pumpkin).

<sup>(29)</sup> ECLAC (2015b). A look at the countries of the Mesoamerica Project. Mexico. 118 pp.

<sup>(30)</sup> World Bank (2016). Data: CO<sub>2</sub> emissions (metric tons per capita). Available at <http://datos.bancomundial.org>

<sup>(31)</sup> World Bank (2014). World Development Indicators: Energy dependency, efficiency and carbon dioxide emissions. Available at <http://wdi.worldbank.org>

<sup>(32)</sup> Brown N., T. Geoghegan and Y. Renard (2007). A Situation Analysis for the Wider Caribbean. IUCN, Gland, Switzerland.

<sup>(33)</sup> ECLAC (2015b). Op cit.





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*La Visite National Park, Haiti. Like many of the region's tropical coniferous forests, the pine forests of Hispaniola are subject to intensive exploitation. The endemic *Pinus occidentalis* is endangered due to overexploitation, slash-and-burn subsistence agriculture and, particularly, charcoal production.*  
(© Conservation International/Pierre Carret)

They are a source of food, wood, firewood and medicinal plants for the local populations. They are vital sources of income, livelihood and well-being for rural populations, in particular for indigenous peoples, people of African descent and small farmers<sup>34</sup>. They often have significant cultural and spiritual value for indigenous groups and provide unique landscape values.

Large, undisturbed forests are of particular importance as they have a greater capacity to support a fuller range of biological diversity, including populations of large predators and other vertebrates. They are more resilient to climate change and contribute to global climate change mitigation, including through their ability to store large amounts of carbon.<sup>35</sup>

### **Tropical rainforest**

Fifty of the 867 ecoregions reported worldwide belong to this biome, 29 of which are represented in Central America and the Caribbean<sup>36</sup>. This reflects the biological richness and complexity of these forests in the region, which also show high levels of local and regional endemism.

This biome originally covered 47 % of the area of the region.<sup>37</sup> Approximately 23 % of its original area is currently under a public protection regime, mostly as a 'managed protected area' or 'national park'<sup>38</sup>. The largest PAs protecting this biome are found on the Caribbean side of Central America.

The Selva Maya, located between Guatemala, Mexico and Belize, is the most important intact forest patch in Central America and one of the still large and relatively intact forest masses in the subregion, among which are also the Moskitia (Honduras and Nicaragua), Río Plátano and Bosawás (Honduras and Nicaragua), Indio Maíz and Tortuguero (Nicaragua and Costa Rica), La Amistad (Costa Rica and Panama) and Darién (Panama and Colombia).

It is estimated that 24 % of the original surface of this biome in the region was lost by 2009, caused by the conversion to other land uses. It is particularly sensitive to tillage, overgrazing and excessive burning due to its climatic conditions and soil characteristics<sup>39</sup>. The most threatened areas are in the most

<sup>(34)</sup> FAO (2018). The State of the World's Forests – Forest Pathways to Sustainable Development. Rome. Available at <http://www.fao.org/state-of-forests/es/>

<sup>(35)</sup> <https://www.globalwildlife.org/project/forests-for-life/>

<sup>(36)</sup> WWF (2016a). Largest habitat types: terrestrial habitats 2016. Available at <http://www.panda.org>

<sup>(37)</sup> Central America and the Dominican Republic have a total of 216 801 km<sup>2</sup> of broadleaf rainforests. Regional REDD/CCAD-GIZ Program (2014) Regional Forest Geospatial Data Platform (GEO-Forest+).

<sup>(38)</sup> IUCN – UNEP-WCMC (2016). The World Database on Protected Areas (WDPA) (2016). Available at [www.protectedplanet.net](http://www.protectedplanet.net)

<sup>(39)</sup> WWF (2016a). Op cit.





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*Cloud forest in the Santa Elena Reserve, Costa Rica. Cloud forests are characterised by their rich vegetation. Due to their capacity to catch the fogs that frequently cover them, they provide essential water-related services, like aquifer recharge, water retention and flood control, and local climate regulation. (© Gregoire Dubois)*

populated areas, particularly the Greater Antilles (in Haiti, Dominican Republic, Puerto Rico and Jamaica), the Magdalena-Cauca basin in Colombia, the Pacific coasts of Mexico and Central America and the Caribbean coast of Venezuela. Another example is the seasonal rainforest in Costa Rica, which has already lost 75 % of its original area.

In this biome, management efforts should be concentrated on restoring the surface where it has been most stressed, particularly in the Caribbean subregion. Some islands have already implemented reforestation efforts, like Cuba since the 1960s. On the other hand, their conservation should be promoted in the Central American subregion in PAs connected and integrated to the broader landscape matrix, among others in the framework of the MBC.

### **Tropical dry forest**

This biome used to cover 24 % of the region's surface. It covers the lowlands of the Pacific coastal zone and the pre-montane sector of El Salvador, Guatemala, Honduras, Nicaragua, Guanacaste in Costa Rica and the Dry Arch zone of Panama. This area is called the dry corridor. It also extends along the Caribbean coast of Colombia and Venezuela and the Greater Antilles.

Only 6 % of its original area is under some form of public protection in the region, mainly as a 'protected landscape', 'national park' or 'habitat and species management area'<sup>40</sup>.

Although often less biodiverse than tropical rainforests, tropical dry forests are home to a high diversity of species. Among the most emblematic are the Mexican red-kneed tarantula (*Brachypelma smithi*), the orange-breasted bunting (*Passerina leclancherii*), the white-throated magpie (*Calocitta formosa*) and the West Mexican chachalaca (*Ortalis poliocephala*). It is also the habitat of large predators such as the puma (*Puma concolor*) and jaguar (*Panthera onca*).

In fact, the most diverse dry forests in the world are found in southern Mexico, which also has 40 % of endemic species. They are characterised by a biodiversity adapted to marked dry seasons. Deciduous trees dominate the forests, which cause the canopy to open in the dry season, facilitating the growth of a thick understorey<sup>41</sup>.

It is estimated that 42 % of the original area of this biome in the region was lost until 2009, caused by conversion to other land uses. The converted dry forest area even exceeds 65 % in

<sup>(40)</sup> IUCN – UNEP-WCMC (2016). Op cit.

<sup>(41)</sup> WWF (2016a). Largest habitat types: terrestrial habitats 2016.



Central America, Jamaica and Hispaniola. It is particularly sensitive to excessive burning and deforestation, overgrazing and the presence of exotic species, which can quickly alter natural communities. Restoration is possible but difficult, particularly if degradation has been intense and persistent<sup>42</sup>. A large part of the dry forest areas that were deforested present desertification processes and droughts are intensifying. Consequently, agricultural or livestock production gradually becomes unsustainable in these areas, which has a strong impact on the livelihoods and food security of rural populations<sup>43</sup>. This is particularly worrying in the dry corridor of Central America, where it is estimated that more than 1 million families depend on subsistence agriculture.

As restoration in this type of ecosystem is complex, it is a priority to conserve the remnants that remain and to integrate them into a productive landscape matrix. This is all the more urgent considering that most of the regional population lives in areas of dry forest and continues to grow, so the demand for ecosystem services provided by these forests will carry on increasing.

### **Tropical coniferous forest**

This biome used to cover 15 % of the region's surface. The greater extensions are in the south of Mexico, Guatemala, Honduras and Nicaragua, as well as in the west of Cuba, and in some sites of Dominican Republic and Haiti. About 10 % of its original area is under some kind of public protection regime in the region, mainly within national parks.

It is characterised by the occurrence of various species of conifers, whose needles are adapted to cope with variable climatic conditions. Its understory is composed of shrubs and small trees and the ground is often covered with fungi and ferns because the closed canopy blocks the passage of light. It has a considerable level of local endemism and provides habitat for a large number of species, including migratory birds during the winter<sup>44</sup>.

In Central America this biome is developed in irregular mosaics, on the summits and slopes of the mountains, favouring the appearance of endemisms. Mexico is home to the richest and most complex tropical conifer forests in the world, with more than 350 endemic species of orchids, as are, to a lesser extent, Guatemala and Honduras, where they are preserved almost exclusively on isolated mountain tops and higher mountain slopes.

In the Greater Antilles, there are 4 species of endemic pine, including *Pinus occidentalis* in the Hispaniola and *Pinus tropicalis* in Cuba, which is often associated with the unusual royal palm (*Roystonea regia*). Some of its characteristic bird species are the Cuban tody (*Todus multicolor*), Cuban trogon (*Priotelus temnurus*) and the Hispaniola trogon (*Priotelus roseigaster*). Reptiles include iguanids such as *Leiocephalus macropus*, *L. onaneyi*, *Anolis alayoni* and *A. vanidicus*.

The main pressures on these forests are deforestation for agricultural activities, unsustainable logging, hunting and fires. In countries such as Honduras and Nicaragua, most of the national wood industry is based on pine forests. It is estimated that at least 20 % of the original area of this biome in the region was lost by 2009, due to conversion to other land uses<sup>45</sup>. Some ecoregions have been more affected, such as the pine-oak forests of Central America (loss of 74 %), the pine forests of Cuba (loss of 45 %) and the pine-oak forests of Central America (loss of 25 %).

For this biome it will be essential to establish cooperative programmes for the prevention and management of forest fires and pests, and to develop restoration strategies. It is also necessary to raise awareness among authorities and civil society about the importance of conserving coniferous forests and their avifauna, as part of a comprehensive strategy to avoid further deforestation.

## **1.3.2 Deserts and xerophilic scrub**

This biome is found mainly on the Caribbean coasts of Colombia and Venezuela, and in southern Mexico. They are subject to very little legal protection.

Extreme temperatures and high evapotranspiration are a fundamental characteristic of the biome, which is dominated by shrubs and woody-stemmed plants. Xerophytic scrub can have an extraordinarily rich floral diversity. They also have a high diversity of reptiles and high levels of local endemism.<sup>46</sup>

In Mexico, the Tehuacán-Cuicatlán Biosphere Reserve is representative of this biome. Of a total of 2 700 species of plants, 30 % are endemic, including 4 endemic genera of angiosperms: *Gypsacanthus*, *Oaxacania*, *Pringleochloa* and *Solisia*. It is also the centre of origin and diversification of the genus *Agave*. Ten of the 90 bird species present are endemic and a high endemism of bats has been recorded (34 species).<sup>47</sup>

<sup>(42)</sup> WWF (2016a). Ibid.

<sup>(43)</sup> FAO (2015a). Disaster Risk Programme to strengthen resilience in the Dry Corridor in Central America.

<sup>(44)</sup> WWF (2016a). Op cit.

<sup>(45)</sup> The Nature Conservancy based on World Conservation Atlas (Hoekstra et al., University of California Press, 2010) and Global Land Cover 2009 (Joint Research Centre, 2012).

<sup>(46)</sup> WWF (2016). Terrestrial ecoregions. Deserts and xeric shrublands. Retrieved from: <https://www.worldwildlife.org/biomes/deserts-and-xeric-shrublands>

<sup>(47)</sup> WWF. Terrestrial ecoregions. Deserts and xeric shrublands: Southern North America: Southern Mexico. Retrieved from: <https://www.worldwildlife.org/ecoregions/nt1316>



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*A landscape of columnar cacti typical of the xerophilic scrub ecosystems in the Tehuacán-Cuicatlán Biosphere Reserve (southeastern Mexico). One of the main centres of diversity for the cacti family, which is critically endangered worldwide, the UNESCO World Heritage Site also has the oldest water management system on the continent, with canals, wells, aqueducts and dams associated with early agricultural settlements. (Leonid Andronov/Alamy)*

On the coasts of Colombia and Venezuela, this biome extends mainly in the peninsula of La Guajira. The Guajira-Barranquilla ecoregion is a unique xerophytic area in the Neotropics. It is a centre of bird endemism and presents a particularly rich herpetofauna, with 76 species including the endangered *Geochelone carbonaria* and *Phrynosoma dahlia*. A total of 468 plant species have been listed in the La Guajira Peninsula, where the most diverse families are *Leguminosae* (51), *Asteraceae* (36), *Poaceae* (24) and *Euphorbiaceae* (18).<sup>48</sup>

These ecosystems are very sensitive to grazing, soil disturbance, burning and tillage. Their restoration potential can be very low since regeneration is so slow. The sparse vegetation, compared to other biomes in the region, is fundamental for water

regulation. When removed, water abstraction decreases dramatically, with consequent effects on all biodiversity. Likewise, the presence of invasive species can be a serious problem. In addition, many cactus species are threatened by illegal extraction and trafficking on a national and international scale.

It is estimated that at least 46 % of the original area of this biome was lost in the region up to 2009<sup>49</sup>. Some ecoregions have been more affected, such as the Matorral Xerófilo of Guajira-Barranquilla (loss of 53 %). Promoting greater understanding of the importance of the ecosystems belonging to this biome is very important, especially in an increasingly extreme climate context, and to provide the areas with a greater degree of protection.

<sup>(48)</sup> WWF. Terrestrial ecoregions. Deserts and xeric shrublands: Northern South America: Northern Colombia and northwest Venezuela. Retrieved from: <https://www.worldwildlife.org/ecoregions/nt1308>

<sup>(49)</sup> The Nature Conservancy based on World Conservation Atlas (Hoekstra et al., University of California Press, 2010) and Global Land Cover 2009 (Joint Research Centre 2012).





### 1.3.3 Mangroves

This biome used to cover 4.6 % of the region's surface. It is found along the coasts of the Pacific and the Caribbean.<sup>50</sup> Some areas have been declared Wetlands of International Importance or Ramsar Sites, and include national parks, forest reserves and wildlife refuges.

Mangroves are located on waterlogged, saline soils that are subject to tidal flow. They are composed of salt-tolerant trees, which are associated with a large number of aquatic plants. Together, they provide important breeding habitats for a wide variety of aquatic animal species. In general, they have a low floristic diversity, but at the same time high degrees of regional endemism.

Mangroves, along with flooded grasslands, are two of the most important wetland types in the world for their provision of ecosystem services. Historically, the people of the region have developed their cultures based on a very close relationship with wetlands<sup>51</sup>. To date, they play an important role in the local and

national economy, due to their high productivity and close relationship with fisheries production. Also, along with other coastal wetlands, they filter water pollution and buffer the impact of large swells and hurricanes. Like the different types of forests, they are important for carbon sequestration (called 'blue carbon' in this case).

The Colombian Caribbean is notable for its marshes, which are interconnected with mangroves and coastal wetlands. This group of ecosystems, like all large wetlands, provide services of great ecological and socioeconomic importance. In particular, they play a strategic role in cushioning the effects of flooding and the dragging of sediments from the rivers that flow down the western slope of the Sierra Nevada de Santa Marta and from the pipes that flow out of the Magdalena River<sup>52</sup>. Two of the important remnants of this type of wetland are the lagoon complexes of the large Santa Marta marsh and the Zapatosa marsh.

Mangroves are among the most threatened ecosystems on the planet, and this region is no exception. By 2009, 20 % of their original area had been lost in Central America and the Carib-

<sup>(50)</sup> According to the latest data available for Central America and the Dominican Republic, there is currently a total of 4 301 km<sup>2</sup> of mangroves. Regional REDD/CCAD-GIZ Program (2014) and Regional Forest Geospatial Data Platform (GEO-Forest+).

<sup>(51)</sup> Central American Commission on Environment and Development (CCAD) (2002). Central American Policy for the Conservation and Wise Use of Wetlands. San José, C.R., CCAD. 45 pp.

<sup>(52)</sup> Mesa-S. L. M., M. Santamaría, H. García and J. Aguilar-Cano (2016). Biodiversity catalogue for the Caribbean Region. Environmental planning series for biodiversity conservation in Ecopetrol's operational areas. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt.



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*Olive Ridley turtle (Lepidochelys olivacea), Belize. Sea turtles are umbrella species of the Caribbean marine environment. Despite being the subject of specific conservation programmes, they continue to be preyed upon by hunters and poachers, while beach transformation and erosion disrupts nesting sites and their reproductive cycle. They also suffer from pollution of their natural environment by marine litter and are victims of accidental fishing (bycatch). All species in the region are considered threatened or endangered. (© Antonio Busiello/WWF-US)*

bean.<sup>53</sup> Mangroves are subject to a gradual process of degradation due to various anthropogenic pressures: sedimentation, water pollution (by agrochemicals, hydrocarbons, urban wastewater, etc.) and salinisation, the development of urban, tourist, industrial or aquaculture infrastructures (particularly shrimp farms), and overfishing.

Mangrove restoration should be a priority in the countries of the region, particularly in the Caribbean islands. In fact, better management and support for wetland restoration is an essential strategy for meeting at least 7 of the 17 Sustainable Development Goals for 2030<sup>54</sup>.

### 1.3.4 Flooded grasslands and savannahs

These ecosystems used to occupy 0.4 % of the region's surface area.<sup>55</sup> The largest areas are in Cuba and on the southern border between the Dominican Republic and Haiti.

They are home to a rich biodiversity of fauna and flora, adapted to unique hydrological regimes and soil conditions, and are characterised by large congregations of migratory and resident water birds. Like mangroves, these ecosystems provide fundamental ecosystem services related to hydrological regulation, control of pollution processes and provision of habitat for species reproduction.

It is estimated that about 22 % of the original area of this biome was lost in the region by 2009.<sup>56</sup> The Enriquillo wetlands (Haiti and Dominican Republic), with a loss of 67 %, are the most affected.

Their protection requires the implementation of specific conservation and restoration strategies, including the mitigation of the main pressures: the diversion and canalisation of water-course flow, water pollution and eutrophication, as well as land-use change in riparian and gallery habitats.<sup>57, 58</sup>

### 1.3.5 Umbrella species

Within the biomes described above, there are umbrella species that require particular attention, due to their local and/or regional importance. Umbrella species<sup>59</sup> can play important roles in natural processes, for example as population regulators or seed dispersers, thus contributing to the conservation of certain ecosystems and/or species. They are usually species valued by humans for their cultural or religious significance, uniqueness, beauty or use for consumption. Many of them are large with a high longevity and low reproductive rates, which makes them very vulnerable to human activity.

Their protection implies the implementation of major national and regional strategies that include: the definition of ecologically significant management areas; the analysis of conflicts with humans and ways to resolve them; the monitoring of the effectiveness of investments; and the adaptation of investments to changes over time<sup>60</sup>. Focusing on the protection of these species contributes to the conservation of other species and large natural areas in good condition.

These species are mentioned in each of the key landscapes for conservation detailed in Chapter 5, and recovery measures are listed for the most important ones. Some species, such as the jaguar (*Panthera onca*), merit work at the scale of most of Latin America. Others, such as the Hispaniolan solenodon (*Solenodon paradoxus*), rock iguanas (*Cyclura ricordii* and *C. collei*) or the Ridgway's hawk (*Buteo ridgwayi*) and Cuban kite (*Chondrohierax wilsonii*), are more localised and specific to the region. In the marine environment, species with potential as umbrella species include sharks and sea turtles (*Chelonia mydas*, *Dermochelys coriacea* and *Eretmochelys imbricata*) in the Caribbean.

(<sup>53</sup>) The Nature Conservancy based on World Conservation Atlas (Hoekstra et al., University of California Press, 2010) and Global Land Cover 2009 (Joint Research Centre, 2012).

(<sup>54</sup>) Wetlands International (2016). Available at: <https://www.wetlands.org/news/no-sustainable-development-goals-unless-action-is-taken-to-reduce-the-deficit-in-natural-infrastructure/>

(<sup>55</sup>) Regional REDD/CCAD-GIZ Program (2014). Regional Forest Geospatial Data Platform (GEO-Forest+).

(<sup>56</sup>) The Nature Conservancy. Op cit.

(<sup>57</sup>) WWF. Terrestrial ecoregions. Flooded grasslands and savannas: Cuba. Retrieved from: <https://www.worldwildlife.org/ecoregions/nt0902>

(<sup>58</sup>) WWF. Terrestrial ecoregions. Flooded grasslands and savannas: Caribbean: Island of Hispaniola. Retrieved from: <https://www.worldwildlife.org/ecoregions/nt0903>

(<sup>59</sup>) See Lambeck R.J. (1997). Focal species: a multi-species umbrella for nature conservation. Conservation Biology 11(4), pp. 849-856.

(<sup>60</sup>) WCS (2001). Landscape species for site-based conservation. *Living landscapes*. Newsletter 2.





# #2

## Context, problems and challenges of conservation ►

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*Viñales Valley in Cuba, a World Heritage Site, is a karst landscape where traditional methods of agriculture (notably tobacco growing) have survived unchanged for centuries. Reduced water supply due to climate change and increased urban and tourism development are the main threats to this landscape – and to much of the Caribbean.*  
(Nikada/iStock)





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*The glass frog (Centrolene tayrona) is endemic to the Sierra Nevada de Santa Marta in Colombia and is classified as vulnerable. Like many frog species, it suffers from habitat loss, pesticide use, water pollution and exposure to the amphibian chytrid fungus, which has been responsible for massive worldwide die-offs of amphibians since the 1980s. (© Gregoire Dubois)*

## #2 \_ Context, problems and challenges of conservation

### 2.1 STATE OF CONSERVATION AND MAIN PROBLEMS

#### 2.1.1 Human ecological footprint

The region's high biodiversity is threatened by a number of human pressures, which are reflected in the Human Ecological Footprint Index<sup>61</sup>. This index is relatively high in the region, particularly in the islands of the Caribbean where population density is greater.

In general, human pressures are most intense, widespread and increasing most rapidly in areas of greatest biodiversity<sup>62</sup>. Their impacts are reinforced by the effects of climate change. These pressures are detailed in sections 2.2 and 2.3.

<sup>(61)</sup> The Human Ecological Footprint Index shows the impacts of human pressures through the analysis of recent spatial information regarding: 1) environments with infrastructure or built environments, 2) population density, 3) electrical infrastructure, 4) farmland, 5) grazing land, 6) roads, 7) railways and 8) waterways. Source: World Wildlife Fund (WWF) (2014). Living Planet Report 2014: Species and spaces, people and places. 180 pp.

<sup>(62)</sup> Venter O., E. Sanderson, A. Magrath, J. Allan, J. Beher, K. Jones, H. Possingham, W. Laurance, P. Wood, B. Fekete, M. Levy and J. Watson (2016). Sixteen years of change in the global terrestrial human footprint and implications for biodiversity conservation. *Nature Communications* 7, doi:10.1038/ncomms12558.

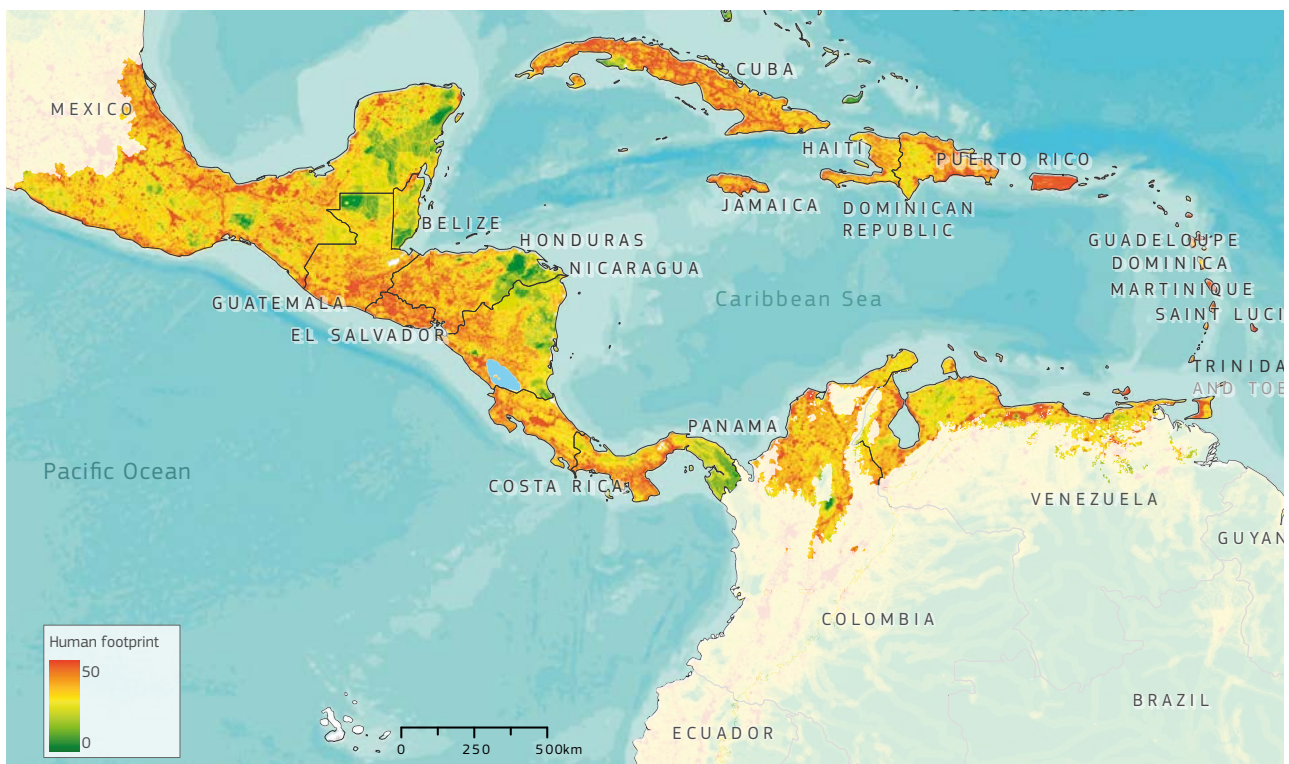




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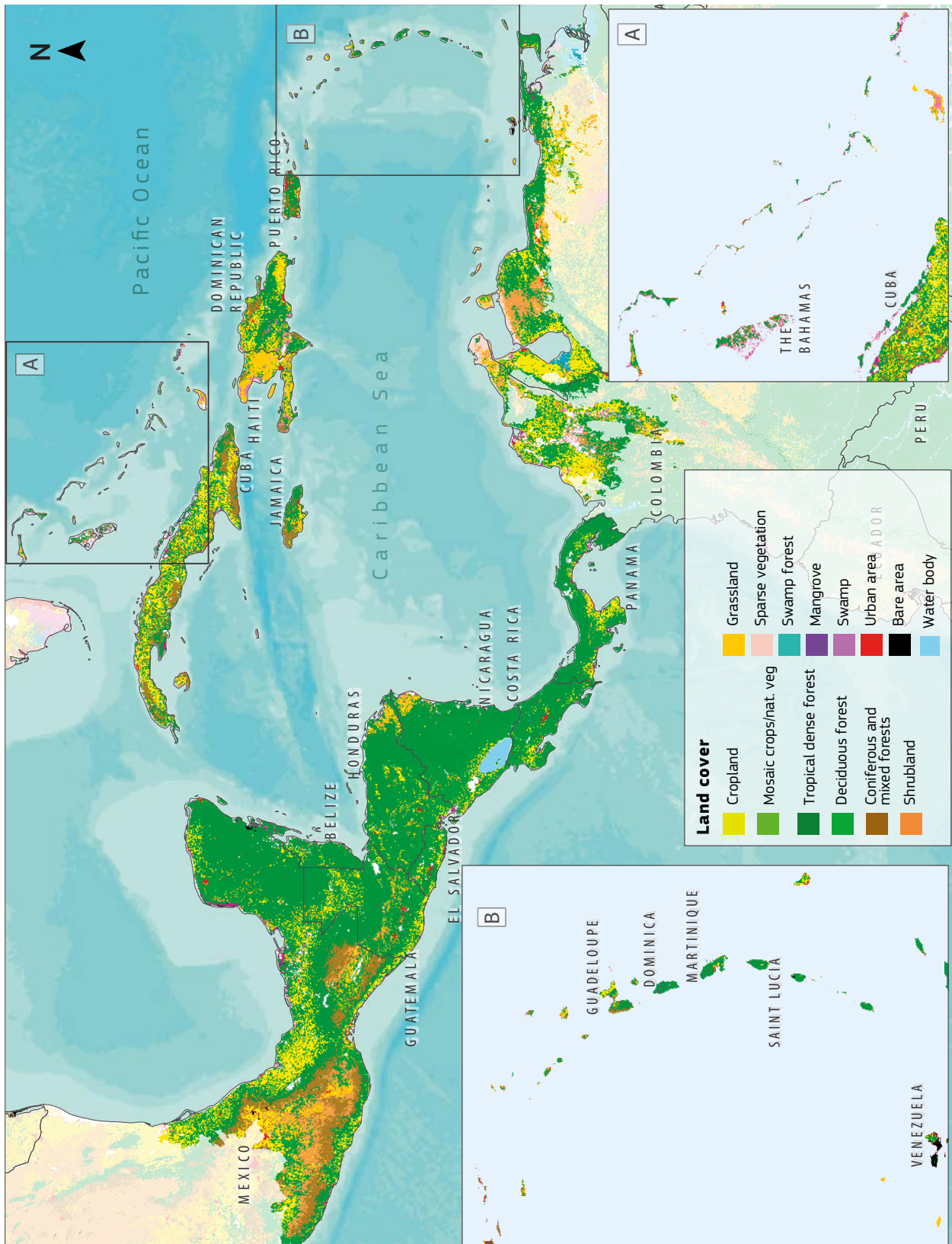
*The region's human ecological footprint is growing rapidly. Urban expansion is a major factor in this. Mangroves in the Bay of Panama have lost 50 % of their surface area since the 1970s, due not only to property development, but also as they are being gradually asphyxiated by sedimentation and pollution from the city. (Mabelin Santos/Alamy)*

**FIGURE 3** Human Ecological Footprint Index in Central America and the Caribbean



Source: Venter O., E. Sanderson, A. Magrath, J. Allan, J. Beher, K. Jones, H. Possingham, W. Laurance, P. Wood, B. Fekete, M. Levy and J. Watson (2016). Sixteen years of change in the global terrestrial human footprint and implications for biodiversity conservation. *Nature communications* 7:12558 | DOI: 10.1038/ncomms12558. Global terrestrial Human Footprint maps for 1993 and 2009

**FIGURE 4** Land cover in Central America and the Caribbean



Source: Adapted from the European Space Agency's Climate Change Initiative Land Use Map, 2015.





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*Bleached boulder brain coral (Colpophyllia natans), los Roqueso, Venezuela. The Mesoamerican Barrier Reef is the longest barrier reef in the western hemisphere, and one of its most biodiverse ecosystems. Its fish species and tourism contribute to the livelihood of close to a million people. But mass tourism, poor waste management and climate change have led to serious degradation. Coral bleaching, observed since 1998, is particularly noticeable around Caribbean islands and the Central American coast. (Carlos Villoch, MagicSea.com/Alamy)*

### 2.1.2 Degradation and transformation of ecosystems

According to the International Union for Conservation of Nature's (IUCN) Red List assessment criteria, most of the region's forests are either endangered or vulnerable<sup>63</sup>. In terms of area, less than 50 % of the original forests and natural ecosystems remain in Central America.<sup>64</sup> Likewise, in the Caribbean (insular and coastal), there are few well-preserved natural areas outside the PAs and mountainous regions. In the Caribbean hotspot, it is estimated that only 11.3 % of the original natural ecosystems remain intact.

With the exception of Costa Rica, the annual rate of deforestation in Central American countries is very high, although it has been decreasing (regional average of 1.4 % between 1990 and

2000, 1.1 % between 2000 and 2010 and 0.73 % between 2010 and 2015). In 2015 there were approximately 202 500 km<sup>2</sup> of forest in Central America, or 25 % less than in 1990. A similar situation is observed on the Caribbean coast of Colombia and Venezuela, where most of the original ecosystems have been transformed for agricultural production.

In the insular Caribbean, by contrast, total forest cover increased by 43 % between 1990 and 2015, reaching about 72 000 km<sup>2</sup> by 2015.<sup>65</sup> This was due to natural regeneration following the abandonment of previously cultivated land and to a lesser extent to reforestation efforts, mainly in Cuba, the Dominican Republic and Puerto Rico. For example, forests in Cuba currently cover 24 % of the original forested area, but a good share of this consists of secondary or planted forest. In other islands, however, such as Haiti and Jamaica, deforestation continues and the forest cover is very low<sup>66,67</sup>.

<sup>(63)</sup> Ferrer-Paris J.R., I. Zager, D.A. Keith, M.A. Oliveira-Miranda, J.P. Rodríguez, C. Josse, M. González-Gil, R.M. Miller, C. Zambrana-Torrel and E. Barrow (2019). An ecosystem risk assessment of temperate and tropical forests of the Americas with an outlook on future conservation strategies. *Conservation Letters*. 2018; e12623. Available at <https://doi.org/10.1111/conl.12623>

<sup>(64)</sup> Regional REDD/CCAD-GIZ Program (2014). Regional Forest Geospatial Data Platform (GEO-Forest+).

<sup>(65)</sup> FAO (2015b). Global Forest Resources Assessment 2015. Data compendium. Rome. Available at: <http://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/es>

<sup>(66)</sup> FAO (2011). State of the World's Forests. FAO UN, Rome.

<sup>(67)</sup> FAO (2016). State of the World's Forests 2016. Forests and agriculture: land-use challenges and opportunities. Rome.





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*Puma (Puma concolor), Mexico. An umbrella species with a wide geographic distribution (Canada to Patagonia), the puma is considered near-threatened, due to persecution by ranchers, habitat degradation and fragmentation, and prey depletion. Conserving biological corridors is essential for the sustainability of the populations of this large predator. (Shutterstock)*

Other important ecosystems are also affected. For example, 75 % of coral reefs are threatened and less than 10 % are in good condition, despite their contribution to the regional economy, estimated at USD 2 billion per year (from tourism, fisheries and coastal protection)<sup>68</sup>.

There is a general trend towards the over-exploitation of resources, particularly in coastal areas, which is also often associated with high levels of poverty, inequality and violence. This pressure, coupled with the effects of climate change, makes it difficult to consolidate conservation efforts.

Pressure on ecosystems also has potential severe consequences for human health, as the recent coronavirus epidemic has highlighted. It is estimated that more than 60 % of emerging infectious diseases in the world are zoonotic (transmitted between animals and humans). The vast majority of these (over 70 %), such as coronavirus (COVID-19), avian influenza, Ebola, dengue, Lyme disease, or Zika, originated in wildlife. The connection between wildlife, disease and people is not new. However, emerging infectious diseases have quadrupled in the past 50 years. Human activities that bring us too close to wild species (habitat fragmentation, land-use change, etc.) or bring them too close to us (wildlife trafficking) increases significantly our exposure to pathogens new to the human body. The risk of

zoonosis transmission is particularly high in tropical forested regions that are undergoing land-use change and have high biodiversity (especially mammals). On the contrary, biodiverse ecosystems in their natural state limit the exposure and potential impact of pathogens through a dilution or buffering effect. Raising awareness of this reality in local communities, public opinion and among decision-makers could contribute to promoting development approaches that mitigate these risks, with important collateral benefits for people, biodiversity and the climate<sup>69</sup>.

### 2.1.3 Loss of species

LAC has the highest proportion of threatened species in the world (25 %), and the likelihood of their extinction is increasing in terrestrial, coastal, marine and freshwater habitats. This region is no exception. For example, 703 globally threatened species have been identified in the Caribbean islands, a figure that is among the highest of all the hotspots<sup>70</sup>. More worryingly, most of the region's threatened species are endemic and are confined to a few islands or patches of forest. The risk of extinction of birds, among others, registered a significant increase over the past decade in LAC: 40 % of birds in Central America are already threatened. As an important migratory corridor,

<sup>(68)</sup> <https://www.caribbeanchallengeinitiative.org/about/caribbean-s-marine-environment>

<sup>(69)</sup> <https://blogs.iadb.org/sostenibilidad/en/what-is-the-link-between-covid-19-and-the-ecological-and-climate-emergencies/>. Accessed 3 April 2020.

<sup>(70)</sup> Critical Ecosystem Partnership Fund (2010). Ecosystem profile: Caribbean Islands Biodiversity Hotspot. BirdLife International.





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*Forest fire in Orange Walk district, Belize. The burning of vegetation is a common practice in Central America, where it is used to clear forest for agriculture and to manage crop residues. Mismanagement often results in forest fires, the frequency and intensity of which are amplified by the effects of climate change. Fires are a significant sign of the human footprint in the region. (imageBROKER/Alamy)*

especially for birds, these species losses can have a multiplier effect in North and South America.

Habitat transformation and/or loss are the main pressures affecting most of the threatened species on the IUCN Red List.<sup>71</sup> Farming and infrastructure (roads, dams, etc.), while considered necessary for regional development and integration, are primarily responsible for land-use change. They can also create barriers to the movement of animals if they are poorly located or managed. This leads to population decline, reproductive isolation, genetic degradation and consequent local extinction. For example, in Central America, the range of the white-lipped peccary (*Tayassu pecari*), an indicator species of the state of ecosystems, has been reduced by 87 %.

In Central America, the conversion of natural ecosystems into productive systems is responsible for a 34 % reduction in the mean species abundance (MSA). Other significant pressures are the construction of road infrastructure (responsible for the loss of 9 % of MSA), the fragmentation of natural areas (6 %) and the impacts of climate change (2.5 %). Over-exploitation of living resources and invasion by alien species are aggravating

factors. The modelling of impacts on biodiversity under three future socio-economic scenarios to 2030<sup>72</sup> indicates that, in all cases, the main cause of biodiversity degradation will continue to be land-use change, but that impacts associated with climate change will increase<sup>73</sup>. A relatively similar situation is observed on the Caribbean coast of Colombia and Venezuela.

In contrast, the conversion of natural ecosystems to productive systems in the insular Caribbean is no longer the greatest pressure on biodiversity. Infrastructure construction, pollution and the overexploitation of living resources, related to high population density and tourist flows, are serious threats. Likewise, in the island context, the impacts of climate change and invasive alien species are exacerbated.

Ecosystem degradation and biodiversity loss undermine the sustainability of the region's economies, particularly in the Caribbean SIDS, which are highly dependent on fisheries and tourism and have more limited natural resources (e.g. drinking water).

<sup>(71)</sup> Juffe-Bignoli, D. (2014). Protected Planet Report 2014. UNEP-WCMC, Cambridge, UK.

<sup>(72)</sup> (1) A baseline scenario that contemplates the projection of policies and the pattern of expansion that has taken place so far, characterised by the reduction of primary forest and the expansion of agricultural systems; (2) a scenario of implementation of the Alliance for the Sustainable Development of Central America (ALIDES), characterised by the transformation of the areas susceptible to the implementation of the Clean Development Mechanisms into integrated productive systems; (3) a Trade Liberalisation scenario characterised by the implementation of the free trade agreements adopted by the countries of the region.

<sup>(73)</sup> CCAD (2010). Current Status and Future of Biodiversity in Central America. Strategic Program for Monitoring and Evaluation of Biodiversity (PROMEBIO). Central American Commission on Environment and Development – SICA.



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*Banana plantation in Central America. Large-scale commercial agriculture is the main driver of deforestation in the region. However, environmental and social standards, certification schemes and effective institutions developed by governments, businesses and producers have the potential to limit the environmental footprint of commodity production.*  
 (© Sumartinrod/Dreamstime)

## 2.2 THREATS TO BIODIVERSITY AND ECOSYSTEMS

### 2.2.1 Agricultural expansion, deforestation and fires

Since colonial times, agriculture has been the main factor in deforestation in the region. In the insular Caribbean, in particular, large coffee and sugar cane plantations have expanded since the 16th century. Some of the smaller islands, including Antigua, Barbados, Bahamas, Bonaire, St Kitts and the US Virgin Islands, lost all their native forest or were totally altered by agriculture. For example, 92 % of Antigua's land area was under sugar cane cultivation for 300 years.<sup>74</sup> After centuries of intensive agriculture, reduced soil fertility and changes in economic conditions led to the progressive abandonment of these export

crops. Parts of the previously cultivated areas have been transformed into pasture and livestock farming has increased.

In Central America and the Caribbean coast, as in many parts of the world, small and medium-scale family agricultural production, oriented to the domestic market, was a predominant agricultural model for centuries. This is supported by a wide variety of crops and extensive cattle-raising. In a wide area from central Mexico to the Panama Canal, one of the main production systems is based on the cultivation of maize and beans, partially irrigated, complemented by coffee, horticulture and off-farm employment. At the end of the 20th century it is estimated that around 11 million people still subsisted on this traditional system, among them many indigenous communities. However, they have been greatly affected by the appropriation of the best land in the valleys by non-indigenous settlers and commercial enterprises<sup>75</sup>.

<sup>(74)</sup> Critical Ecosystem Partnership Fund (2010). Op. cit.

<sup>(75)</sup> Dixon J., A. Gulliver, D. Gibbon and M. Hall (2001). Agricultural Production Systems and Poverty. How to improve smallholder livelihoods in a changing world. FAO and World Bank. Rome and Washington DC.



Agriculture has expanded in Central America and along the Caribbean coast due to the development of cash crops, which are increasingly export-oriented. This began with the large-scale cultivation of maize, beans, rice and sorghum in the 1960s. In the highlands and other hilly areas, coffee was introduced, with severe impacts on mountain forests. Then came a boom in banana cultivation (mainly by transnational banana companies), followed by sugar cane, and more recently pineapple and African oil palm<sup>76</sup>.

The last 20 years have also seen a large expansion of livestock farming, particularly on overexploited soils or soils less suited for cultivation. Between 2000 and 2010, about 75 % of deforested areas in Central America were converted to pasture and the cattle herd increased by 30 %. By 2013, cattle ranching accounted for 18 % of the subregion's agricultural GDP (up to 38 % in Nicaragua) and 20 % of the land was used for livestock-related activities. However, most of the region's livestock holdings remain on small-scale farms, which make them more resilient to adversity and contributes to food security<sup>77</sup>.

In fact, there is an expansion of small-scale agriculture linked to population growth, particularly in the forests of Central America and some Caribbean countries, such as Haiti. While the best agricultural lands are increasingly held by large producers, indigenous and peasant agriculture is spreading on marginal land (hilly areas, poor soils, etc.), further degrading the soils and forcing producers to continue opening new plots. Some displaced populations are even settling within PAs. The most threatened areas include the Moskitia region in Honduras and Nicaragua and the Maya Forest landscape in Guatemala, Mexico and Belize. In addition, small farmers are reproducing certain unsustainable production practices of industrial agriculture, such as the irrational use of pesticides, while moving towards more commercial crops and varieties, to the detriment of agrobiodiversity.

It is worth mentioning the increase in areas deforested for the production of illicit crops or to conceal illegal activities (to be distinguished from informal activities, which represent a significant part of the regional economy). In the northern triangle of Central America (Guatemala, Honduras and El Salvador), the conversion of forest to pasture and oil palm plantations is a common way of grabbing land for organised crime<sup>78</sup>.

Both small and large producers traditionally use fire as a low-cost tool for land-use change (slash-and-burn agriculture) and to maintain cultivated and grazing areas (pasture burning, slash-and-burn). A lack of prevention measures (firebreaks,

control) frequently results in large forest fires. A global study from 2015 indicates that most of the burnt area in Central America between 2003 and 2012 corresponded to areas previously covered by forest.<sup>79</sup> Fires on the Caribbean islands mainly affect dry forests, but even mountain forests burn in exceptionally dry years. Climate change is an aggravating factor, as the incidence of fire increases in dry years or prolonged periods of drought. The pine forests of the Bahamas, Hispaniola and Cuba, and some wetlands such as the Ciénaga de Zapata, have been shaped by fire and are resilient up to a certain threshold<sup>80</sup>.

#### Impacts:

- Fragmentation and extensive loss of natural habitats and associated species, due to the conversion of natural areas into agricultural fields;
- Changes in the flora and fauna composition in adjacent ecosystems (due to the increase in invasive species, the use of biocides, fires, livestock farming and other factors);
- Loss of genetic diversity with the replacement of traditional crops by large-scale monocultures;
- Social conflicts and low sustainability of the production systems of small producers, due to their forced displacement to marginal areas;
- Soil degradation and salinisation, with risk of desertification in the driest areas, due to the increase in the proportion of bare soil, the recurrent use of fire and overgrazing and trampling by cattle;
- Degradation of fragile ecosystems, such as the cays (small islands with a shallow beach, formed on the surface of a coral reef) used as natural corrals for livestock (especially goats) in the Caribbean<sup>81</sup>;
- Changes in hydrological cycles due to sedimentation (as a result of deforestation), with impacts on coastal areas;
- Water pollution by nitrogen, phosphorus, biocides and antibiotics, with consequent adverse effects on human health and aquatic organisms;
- Decrease in the number and effectiveness of pollinators due to the massive use of biocides and other factors;
- Competition between livestock and native fauna for access to pasture and water sources; elimination of native predators by cattle ranchers.

## 2.2.2 Urban expansion and tourism

The population and economies of most countries have grown in recent years, causing extensive development to urban areas and infrastructure (commercial, road, hydraulic, etc.), which has

<sup>(76)</sup> Varela G. (2016). Sixty years of agriculture in Central America. Agricultural producer Central America and the Caribbean (76).

<sup>(77)</sup> Acosta A. and T. Diaz (2014). Policy Guidelines for the Sustainable Development of the Livestock Sector. FAO Subregional Office for Mesoamerica. Panama.

<sup>(78)</sup> Keenan Aylward K. (2018). Integrating Security & Conservation Policy in the Northern Triangle of Central America. WCS.

<sup>(79)</sup> van Lierop, P., E. Lindquist, S. Sathyapala and G. Franceschini (2015). Global forest area disturbance from fire, insect pests, diseases and severe weather events. *Forest Ecology and Management* 352, pp. 78–88.

<sup>(80)</sup> Critical Ecosystem Partnership Fund (2010). Op cit.

<sup>(81)</sup> Ibid.



occurred without sufficient environmental safeguards. In both the Caribbean and Central American subregions, the strongest growth has been in coastal landscapes and dry forests.

Tourism enterprises, mainly focused on sun and beach tourism, reinforce migration patterns towards coastal areas, even though these are ecologically sensitive. With the development of tourism, the need for land to build infrastructure (marinas, ports, hotels, etc.) is increasing. This is accompanied by the planting of ornamental trees, shrubs and grasses for gardens and golf courses; an increase in the consumption of water, energy, construction materials, food and other resources, and the resulting implications for the environment. For example, to supply the energy needs of the growing population (residents and tourists), hydroelectric dams have multiplied in the Caribbean.

#### Impacts:

- Habitat loss and fragmentation: the increase in housing, road and hydraulic infrastructure results in land use changes. The most significant transformation has been in coastal landscapes and ecosystems, with the felling of coastal vegetation and the dredging, channelling and filling of coastal wetlands. For example, 80 % of mangroves in the British Virgin Islands have been destroyed to make way for tourism development.<sup>82</sup> Some species are particularly affected, such as the critically endangered hawksbill turtle (*Eretmochelys imbricata*). Their preferred nesting sites are leeward beaches with gentler waves, which are usually white sand beaches protected by coral reefs that are highly valued by the tourism sector.
- Beach and dune erosion, due to the extraction of sand for construction: this activity tends to be localised and small-scale and difficult to monitor, but its accumulated impact is believed to be significant.
- Invasion and degradation of forests: the expansion of communication and trade routes, mainly in the continental part of the region, facilitates the colonisation of forests and the proliferation of illegal activities (logging, mining, hunting, etc.), and increases the fragmentation of land and water ecosystems and the isolation of PAs.
- Displacement of some agricultural activities due to urban expansion, towards increasingly marginal lands with fragile ecosystems: this is particularly critical in the insular Caribbean, where even agriculture has decreased, affecting food security.
- Hydrological change: increased water consumption from surface and groundwater sources results in saline intrusion processes and changes in ecosystem functioning.

- Water scarcity: hydroelectric dams affect fauna and human populations located downstream, due to the decrease in the flow of rivers that supply drinking water and irrigation systems.
- Soil and water pollution: poor practices in the treatment of urban and industrial waste are resulting in alarming levels of pollution to soils, as well as to ground, surface and coastal waters.
- Wildlife trafficking: tourism encourages the trade in wildlife for both food consumption and other uses. For example, the paca (*Cuniculus paca*, a large rodent) and the white-tailed deer (*Odocoileus virginianus*) are among the most widely offered and in-demand species in many restaurants in Mesoamerica<sup>83</sup>.

### 2.2.3 Species trafficking and the unsustainable use of biological resources

Throughout the region, traditional production systems have relied on the use of natural resources (such as food, fuel, building materials, medicine, etc.). Today, they continue to ensure the subsistence of a significant part of the rural population, in particular the most vulnerable indigenous, peasant and Afro-descendant groups.

Extractive practices have intensified since the second half of the last century, due to population growth, tourism and the opening of new markets within the region towards the USA, Europe and Asia (with the latter generating the highest demand). The acceleration in trade with Asian countries and their investment in Latin America has been accompanied by a massive increase in trans-Pacific organised crime<sup>84</sup>, including wildlife trafficking.

Central America is the subregion with the highest proportion of forest under forest management plans (more than 60 % of the forest area) and is the world leader in this regard. In the Caribbean, the values are intermediate (30 to 40 %).<sup>85</sup> However, unsustainable selective logging and illegal trafficking in precious wood persist, both for export and for the local market (carpentry and construction), and are difficult to quantify. Mahogany (*Swietenia macrophylla*), for example, due to the high value of its timber, has seen its range reduced by more than 60 % in Central America<sup>86</sup>.

In addition, much of the illegal logging in the region is associated with the consumption of fuelwood, which remains an important

<sup>(82)</sup> Ibid.

<sup>(83)</sup> WCS (2004). Hunting in Neotropical Forests: Review of Issues, Identification of Gaps and Definition of Strategies. 206 pp.

<sup>(84)</sup> Myers M. and C. Wise (Eds.) (2016). The political economy of China-Latin America relations in the new millennium: Brave new world. 290 pp.

<sup>(85)</sup> MacDicken K.G., P. Sola, J.E. Hall, C. Sabogal, M. Tadour and C. de Wasseige (2016). Global progress toward sustainable forest management. *Forest Ecology and Management* 352, pp. 47-56.

<sup>(86)</sup> WWF (2015). Big-leaf Mahogany. Available at: [https://www.panda.org/our\\_work/our\\_focus/wildlife\\_practice/profiles/plants/big\\_leaf\\_mahogany/](https://www.panda.org/our_work/our_focus/wildlife_practice/profiles/plants/big_leaf_mahogany/)



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*Tourism infrastructure expansion is both an essential driver of development and one of the main causes of biodiversity loss in the region. Mitigating its impacts is a priority conservation objective, particularly in the small island states of the Caribbean, where infrastructure development impacts key ecosystems. Awareness of this threat, which can also undermine the tourism sector's own interests, is gradually growing among entrepreneurs and regulators. (© O. Langrand)*

source of energy, particularly in poorer areas. For example, 80 % of the wood extracted in Jamaica is destined for this use. Another extreme case is Haiti, where firewood provides 75 % of energy.<sup>87</sup> In this country, the extraction of firewood and charcoal is one of the main causes of the degradation of much of the land, affecting food security as well as ecosystems, hindering restoration efforts and encouraging significant illegal trafficking from the forests located in the Dominican Republic. The potential for achieving conservation objectives is closely linked to meeting the basic energy needs of the population and to governance in the use of natural resources.

In addition, wildlife trafficking generates significant pressure on species. It has received disproportionately low attention from governments and remains a low-risk, high-gain crime. Extraction for local consumption has a considerable impact, but more significant is that of strictly commercial extraction to feed the markets for gastronomy, fashion, pets, aquariums, horticulture, collectors, pharmaceuticals, etc. This problem is difficult to quantify and combat, due to the lack of records and trade statistics on local and international markets – except those listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) – and of objective information on illegal trade.

Direct overexploitation includes unsustainable fishing and poaching, and legal and illegal catches without considering sustainability criteria. In the region it concerns, among others, the parts and meat of the queen conch (*Lobatus gigas*), land and water turtles, sharks, crocodile, caiman, iguana and sea cucumber. Some large mammals, such as the jaguar (*Panthera onca*) and anteater (*Myrmecophaga tridactyla*), are also sought after for use in traditional medicine similar to those of the Asian tiger and pangolin. A recent study has demonstrated a link between Chinese development projects in Central America and the trafficking of jaguar and other wild cats' body parts.<sup>88</sup>

Indirect overexploitation is the unintentional killing of non-target species. This is the case of the vaquita (*Phocoena sinus*), a species endemic to Mexico with an estimated wild population of less than 30 individuals, which is indirectly affected by the illegal capture of the totoaba fish (*Totoaba macdonaldii*), whose swim bladder is highly prized in Asia.

Beyond its impacts on the affected species, wildlife trafficking carries risks for human health. Contact with captured animals and their transport over long distances increases the probability of transmitting pathogens from animal to man.

<sup>(87)</sup> Critical Ecosystem Partnership Fund (2010). Op cit.

<sup>(88)</sup> Morcatty T., J. Macedo, K.A. Nekaris, Q. Ni, C. Durigan, M.S. Svensson and V. Nijman (2020). Illegal trade in wild cats and its link to Chinese-led development in Central and South America. *Conservation Biology* 10.1111/cobi.13498. Advance online publication. <https://doi.org/10.1111/cobi.13498>



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*The near-extinct vaquita (Phocoena sinus) is a porpoise endemic to the Gulf of Mexico with a very limited distribution. It is an indirect victim of the illegal capture of the totoaba fish (Totoaba macdonaldi), whose swim bladder is a highly valued delicacy in Asia. (© UNEP)*

#### Impacts:

- Population reduction or species extinction due to selective extraction, altering food chains and the balance of ecosystems.
- Alteration of ecosystems' capacity to provide services due to forest extraction and wildlife trafficking: affects carbon storage, erosion control, water regulation, pollination, pest control, waste assimilation, etc.
- Threat to traditional lifestyles in the long term: local populations, particularly indigenous peoples, suffer the consequences of biodiversity loss caused by over-exploitation by actors with greater economic and operational capacity.
- Increased crime: profitable activities related to wildlife exploitation and trafficking attract criminal groups with the capacity to threaten the security of local communities and cause civil unrest.
- Increased risk of zoonosis due to contamination of hunters, marketers and buyers/consumers of wildlife species.

#### 2.2.4 Extractive industries

Extractive industries play a central role in the economies of several countries in the region, whether this concerns hydrocarbons (particularly in Venezuela, Colombia and Trinidad and Tobago) or mining (nickel in Jamaica, bauxite in the Dominican Republic, etc.). Governments give them the highest priority, even when they impact on strategic ecosystems and sensitive areas. There are, for example, cases of exploitation within protected areas and in indigenous territories.

Conventional hydrocarbon exploitation takes place mainly on the Caribbean coast of Central and South America, on the sea and coast of the Gulf of Mexico and in Cuba. Mining (mainly of gold and precious stones) takes place almost throughout the region. In recent decades it has become very important in Central America, driven by foreign investment<sup>89</sup>. In 2011, 14 % of the total Central American territory was under concession to mining companies, with the highest concentration in Honduras, Nicaragua and Guatemala<sup>90</sup>. At the same time, illegal mining is increasing, in the form of micro-exploitation using rudimentary technology, due to the high price of gold. Likewise, the extraction of aggregates (sand, gravel, etc.) for the construction sector is on the rise.

<sup>(89)</sup> ECLAC (2015a). Foreign Direct Investment in Latin America and the Caribbean (LC/G.2641-P), Santiago, Chile.

<sup>(90)</sup> Centre for Research on Investment and Trade (CEICOM) (2011). Impacts of metal mining in Central America.





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*Open-pit mining in Mandeville, Jamaica. Bauxite mining has been one of the main drivers of deforestation and soil pollution and degradation in Jamaica since the 1950s. In recent years, the industry has accepted the need for higher standards in order to avoid further environmental damage. (Howard Davies/Alamy)*

Mining, particularly when carried out informally, is one of the sectors that generates the greatest social and environmental impact, and is often associated with high levels of insecurity and human rights violations. In many cases, local communities have initiated processes to demand tougher regulations for mining companies. In Panama, for example, the government cancelled mining concessions in the Ngöbe-Bugle territory in 2012 after protests. However, the large copper extraction project in the Department of Colon in Panama (Cobre Panamá) is still going ahead. In Costa Rica, environmental concerns have prompted an almost total ban on open-pit mining in the country. Regardless of the growth in mining investments, such demands are increasing because the communities affected have more and more information and the means to make their voices heard<sup>91</sup>.

#### Impacts:

- Soil and water pollution: due to the use of highly toxic products without adequate control (e.g. sodium cyanide and mercury for gold extraction)<sup>92</sup>. There is also concern about massive pollution resulting from oil platform accidents (e.g. the explosion of the Deepwater Horizon platform in 2010 in the Gulf of Mexico) or the blowing up of oil pipelines in conflict zones.
- Hydrological change: the mining sector needs enormous quantities of water, which in turn causes sedimentation. This affects aquatic and terrestrial biodiversity that are dependent on the water sources, as well as the human populations located downstream, exposing them to water scarcity and diminishing fish resources.
- Social impacts: disputes over the use of water and land acquisition at the expense of local communities because of their negative impacts on health, livelihoods, governance structures and traditional productive activities, as well as the frustration of local expectations of income distribution<sup>93</sup>.

<sup>(91)</sup> ECLAC (2015a). Op cit.

<sup>(92)</sup> CEICOM (2011). Op cit.

<sup>(93)</sup> ECLAC (2015). Op cit.



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Red lionfish, Cayman Islands. This invasive species, thought to have been released accidentally when a hurricane destroyed a south Florida aquarium, is now the second most abundant fish from the Bahamas to North Carolina. It reproduces rapidly and disrupts the food chain in coral reefs, where it competes with native species. (Blue Sky/Alamy)

### 2.2.5 Introduction of invasive alien species

Many invasive species have been introduced accidentally in the past, or for economic and recreational purposes. In recent years, the arrival of new species has been facilitated by the growth and globalisation of trade and tourism. At the same time, processes of environmental fragmentation and degradation, as well as climate change, facilitate the establishment of new species<sup>94</sup>.

While this threat is present throughout the region, it is particularly relevant on the Caribbean islands, where endemic species are highly vulnerable to invasive species because of their small populations and the absence of natural enemies of introduced species. For example, on some islands, the mongoose (*Herpestes javanicus*), a small carnivorous mammal, was introduced to control snakes and rodents damaging crops. It has become a pest by preying on the eggs and young of native vertebrates. Another invasive species, the giant African snail (*Achatina fulica*), has been observed in Antigua, Barbados and Trinidad.

The problem also affects marine ecosystems. For example, the red lionfish (*Pterois volitans*), a poisonous fish originating in the coral reefs in the Indian Ocean and western Pacific Ocean, has spread throughout the insular Caribbean, as well as parts of Central America and off the northern coasts of Colombia and Venezuela, altering the food chain in their coral reefs<sup>95</sup>. Some algae, such as red algae (*Caulerpa sertularioides*) and green algae (*Acanthophora spicifera*) have proliferated to the point of forming grassland-like areas, affecting corals and reef-dwelling fauna<sup>96</sup>. Also, in the last decade, huge quantities of the algae

sargassum (*Sargassum spp.*) have been deposited on the Caribbean coast. This is due to a combination of factors that include water pollution from the continent (with nitrates and phosphates) and overfishing of its main natural predator, the queen conch (*Lobatus gigas*). As it decomposes, the algae release hydrogen sulphide, which is harmful to human health as well as affecting the fishing and tourism sectors.

In the Caribbean, 552 exotic animal species have been identified, comprising 449 terrestrial (390 naturalised/invasive), 55 freshwater (10 naturalised/invasive) and 18 marine (16 naturalised/invasive) species. Also found were 281 plant species reported as naturalised or invasive, of which 179 are trees. In the Dominican Republic, 138 species have been reported as invasive, including 17 of the 100 worst invaders in the world<sup>97</sup>. In Colombia, the presence of invasive alien species is considered one of the main causes of species extinction, after habitat destruction and climate change<sup>98</sup>.

#### Impacts:

- Displacement or extinction of native species due to competition, predation or disease transmission;
- Significant modification of natural ecological processes due to changes in the faunal or floral composition of ecosystems;
- Effects on the economy, health and quality of life of people due to the alteration of the ecosystems on which their livelihoods depend. However, it is important to recognise that some alien species have positive effects on human economies, as they are used for consumption and other types of use, including industry.

<sup>(94)</sup> IUCN (2000). Guidelines for prevention of biodiversity loss caused by alien invasive species. SSC Invasive Species Specialist Group. 24 pp.

<sup>(95)</sup> Information sourced from the United States Geological Survey (USGS) animated map: <https://nas.er.usgs.gov/queries/SpeciesAnimatedMap.aspx?speciesID=963>

<sup>(96)</sup> Pers. comm., Cindy Fernandez. Center for Research in Marine Sciences, University of Costa Rica.

<sup>(97)</sup> Critical Ecosystem Partnership Fund (2010). Op cit.

<sup>(98)</sup> Government of Colombia (2010). National Environmental Development Plan.





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The mongoose (*Herpestes javanicus*) was introduced to Caribbean islands around 1870 and became a major predator of native vertebrates, causing the extinction of the reptile *Ameiva cinera*, the virtual disappearance of two snakes (*Liophis juliae* and *Alsophis antillensis*) and decimating species of ground-nesting birds. (Manuel Jean-Francois/Alamy)

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The introduction of non-native species to Redonda Island (Antigua and Barbuda) led to the decline and disappearance of certain native species. However, since 2017, a restoration programme focused on eradicating rats and relocating goats has coincided with a spectacular recovery of reptile and landbird populations, and colonies of seabird such as the red-billed tropicbird (*Phaethon aethereus*), above. (Olga Kolos/Alamy)

#### Box 1. THE REDONDA RESTORATION PROGRAMME AGAINST INVASIVE SPECIES<sup>a</sup>

The island of Redonda in the Caribbean, which is part of Antigua and Barbuda, used to have one of the region's largest guano mines, at the end of the 19th century. After the tiny island became uninhabited during World War I, introduced black rats and feral goats were left to roam, maintaining pressure on its vegetation and native animals.

Endemic reptiles like the Redonda ground dragon (*Pholidoscelis atrata*), the Redonda tree lizard (*Anolis nubilis*) and the Redonda pygmy gecko (still unnamed *Sphaerodactylus*) were greatly affected by the destruction of their habitat. The Redonda skink (*Cop-eoglossum redondae*) and Redonda iguana both became extinct, while numerous species disappeared, like the burrowing owl (*Athene cunicularia*). Meanwhile, the land-birds and seabirds suffered from egg predation. Redonda is now internationally recognised as an important bird area, with colonies of magnificent frigatebirds (*Fregata magnificens*), red-billed tropicbirds (*Phaethon aethereus*) and several boobies (*Sula spp.*), amongst others.

A restoration programme that was centred on rat eradication and goat removal was launched in 2017. Within a year, land-bird populations increased tenfold, seabird populations increased and the remaining endemic reptiles saw their populations spike as well. These spectacular results show the benefits of invasive species removal from Caribbean island ecosystems.

References:

a: <https://www.fauna-flora.org/news/magical-transformation-spells-brighter-future-redondas-fantastic-beasts>



## 2.2.6 Expansion of salt and shrimp farms

The production of sea salt and shrimp has grown in the region in response to a global increase in demand. Much of the production involves unsustainable management practices, with significant effects on the region's mangroves and other coastal ecosystems. Poor or inadequate land planning is an underlying factor.

This is not a new phenomenon. In the Gulf of Nicoya in Costa Rica, for example, mangroves lost 15.6 % of their area between 1956 and 1985, due to conversion to shrimp farms.<sup>99</sup> Another example of extreme degradation is found in El Salvador, which lost 60 % of its mangroves between 1950 and 2013, mainly due to the expansion of salt flats and shrimp farms.<sup>100</sup> The same situation is taking place in the mangroves of the Greater Antilles, mainly in Cuba<sup>101</sup>. For decades, many governments in the region have actively supported this industry. In Colombia, for example, the Ministry of Agriculture and the Ministry of Foreign Trade promoted it. Now it is subject to more regulation, following pressure from environmental advocacy groups.

### Impacts:

- Loss of protection of the coastal strip from severe weather events (cyclones, hurricanes) due to the destruction of mangroves; increased saltwater intrusion into agricultural land and coastal water sources;
- Alteration of natural water flows due to the construction of embankments that eliminate the natural effect of tides<sup>102</sup> or the diversion of salt or fresh water for production in pools;
- Water pollution from organic waste, which results in high concentrations of nitrites and ammonia, among others. In addition, there is contamination by antibiotics, antiparasitics, fungicides, algicides, etc;
- Significant decrease in fishery resources due to the degradation of coastal ecosystems and particularly mangroves, which are essential for the juvenile development of many aquatic species;
- Risk of disruption of the coastal subsistence economy due to the loss of fisheries resources and many forest resources (building materials, coal, tannins, medicines and honey), which often support the livelihoods of local communities. In some cases, industrial aquaculture has even led to serious human rights violations, including the confiscation of land, forest and water resources and the eviction of local populations<sup>103</sup>.

### Box 2.

#### EFFECTS OF POLLUTION AND SEDIMENTATION ON COASTAL AND MARINE ECOSYSTEMS

The quality of the water discharged into the sea is a key issue of great concern throughout the region. Water pollution is mainly due to poor practices in the treatment of urban, industrial and mining waste, and run-off into agricultural soils. On the other hand, deforestation on hillsides and poor management of agricultural soils, as well as the extraction of gravel and sand from rivers and beaches, cause erosion and sedimentation processes.

Sediments and pollutants flow downstream and tend to accumulate in coastal and marine ecosystems. They strongly alter biodiversity, leading to the proliferation of diseases, algae and other opportunistic species (which benefit from water acidification), as well as to the reduction in populations of many fish and other native species, including sea turtles and birds due to the degradation of their nesting sites. Sedimentation and contamination also contribute to the decline of coral populations, already under pressure from rising ocean temperatures and the acidity associated with climate change.

Consequently, they affect the coastal economy, based mainly on fishing and tourism, by reducing both the fishing potential and the recreational value of the coasts and beaches.

<sup>(99)</sup> Kuenzer et al. (2011). Cited in Cifuentes-Jara M., C. Brenes, M. Manrow and D. Torres (2014). Land use dynamics and mitigation potential of mangroves in the Gulf of Nicoya. CATIE – CI.

<sup>(100)</sup> Ministerio de Ambiente y Recursos Naturales (2013) Estrategia Nacional de Biodiversidad. San Salvador, El Salvador. 24 pp.

<sup>(101)</sup> UNEP – Centro del Agua del Trópico Húmedo para América Latina y el Caribe (Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC) (2010). Latin America and the Caribbean: an environment in transformation. Panama.

<sup>(102)</sup> Yáñez-Arancibia A. and A.L. Lara-Domínguez (1999). Los manglares de América Latina en la encrucijada, pp. 9-16. In: Yáñez-Arancibia A. and A.L. Lara-Domínguez (Eds.). Ecosistemas de Manglar en América Tropical. Instituto de Ecología A.C. Mexico, IUCN/ORMA, Costa Rica, NOAA/NMFS Silver Spring MD USA. 380 pp.

<sup>(103)</sup> World Rainforest Movement (2002). Mangroves: Local livelihood versus corporate profit. 69 pp.

## 2.3 DRIVERS OF THE THREATS

### 2.3.1 Market forces and perverse subsidies

International demand for raw materials and natural resources has increased as a result of regional and global demographic and economic growth, as well as the growth of the middle class in emerging countries. In Central America and the Caribbean, this trend is reinforced by a demand for goods and services from the tourism sector. Among the products traded on a larger scale are hydrocarbons, a variety of minerals, sugar cane and palm oil for consumption and biofuels, meat and dairy products, shrimp and other seafood, and tropical fruits such as pineapple and banana.

To respond to new economic needs and opportunities, governments are seeking to boost economic activities and trade by encouraging the development of transport infrastructure (road networks, ports, canals and others), favourable legal frameworks and various forms of public-private support (direct subsidies, subsidised credits and tax incentives). They are also keen to establish international trade agreements. However, policies tend to be overly sectoral and underestimate the importance of natural capital and the economic and social costs associated with its degradation. They can result in increased vulnerability and socio-economic inequality.

The Central America Free Trade Agreement (CAFTA) with the USA, signed by El Salvador, Honduras, Nicaragua, Guatemala, the Dominican Republic and Costa Rica, allowed for increased trade between its parties and significantly stimulated some sectors. However, it has been criticised for tipping the balance of power toward large US companies. For example, in 2009, a US mining company challenged El Salvador's decision to deny it authorisation for a gold mining project (taken after citizen protests), appealing to the treaty's foreign investment protection clauses<sup>104</sup>.

In general, the growth of extractive, agricultural, tourism and other activities generates short-term economic benefits for national economies and some sectors of the population. However, this growth often takes place without the necessary social and environmental safeguards. The result is a reduction in the provision of vital ecosystem services (carbon sequestration, hydrological regulation, etc.), which directly affects the population, particularly the most vulnerable groups and in rural areas, increasing social inequality. Unfortunately, the value of these services and the costs associated with their decline are

generally not accounted for in public accounts. With some exceptions, they are also not taken into account in private sector planning, so that there are no specific sources of funding for their preservation or recovery<sup>105</sup>.

This is the case for pineapple in Costa Rica (the world's leading exporter since 2007), free of all tariffs in the USA thanks to the Caribbean Basin Initiative (CBI) and CAFTA. Additionally, under the free trade zone regime, most of the inputs needed for the crop are not taxed internally in Costa Rica<sup>106</sup> either. Although the crop generates significant economic gains, these are not reflected in local development. Instead, there is a worrying degradation of the environment and of the productive structure for local consumption<sup>107</sup>.

Like pineapple monoculture, many subsidised activities in the region are incompatible, not only with biodiversity conservation, but also with the sustainable management of strategic resources such as water and soil.

### 2.3.2 Governance, environmental governability weaknesses and political will

Throughout Central America and the Caribbean, a multitude of actors with different development perspectives and interests coexist and compete for the rights to access and use natural resources. This situation is exacerbated by the small size and high population density of the region's countries. In order to guarantee the sustainable use of resources and the just and equitable distribution of the benefits generated, an appropriate legal framework is required, in agreement with the different stakeholders, and an institutional framework conducive to its implementation, all backed by strong political will.

However, in many of the region's countries, laws related to biodiversity conservation conflict with other legal provisions, related for example to infrastructure development policies<sup>108</sup>. Levels of corruption are perceived as high, as well as the influence of certain groups that seek to direct public policies towards their own interests. The economic power of certain companies allows them to avoid regulatory actions<sup>109</sup>. When the legal framework contemplates sanctions related to environmental crimes, their dissuasive effect is limited if they are set at a low level. For example, in Costa Rica, fines for illegal logging are insignificant in relation to profits. This trend can be found throughout the region in terms of fines for illegal wildlife trafficking.

<sup>(104)</sup> <http://integracionsur.com/libre-comercio-y-mineria-un-caso-salvadoreno-que-debemos-observar/>

<sup>(105)</sup> Interview conducted with Dr Luis Ramos in the context of the preparation of this report. 2016.

<sup>(106)</sup> *The Official Gazette*, N227 file 19.371, 25 November 2014. Available at: [https://www.imprentanacional.go.cr/pub/2014/11/25/COMP\\_25\\_11\\_2014.pdf](https://www.imprentanacional.go.cr/pub/2014/11/25/COMP_25_11_2014.pdf)

<sup>(107)</sup> Carazo, E. and J. Aravena (2016). Production conditions, human and environmental impacts in the pineapple sector in Costa Rica. Central American Regional Association for Water and Environment.

<sup>(108)</sup> UNEP (2011). Environmental Outlook: Latin America and the Caribbean. *GEO LAC* 3. 49 pp.

<sup>(109)</sup> UNDP (2010). Regional Human Development Report for Latin America and the Caribbean 2010: Acting on the Future: Breaking the Intergenerational Transmission of Inequality. San José, Costa Rica: United Nations Development Programme. 208 pp.



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*Global climate change is a serious threat to the region's population and economy as it increases the frequency and intensity of extreme weather events. The Rio Blanco in San Pedro Sula, Honduras, burst its banks after heavy rainfall caused by Hurricane Eta in November 2020, which led to flooding and landslides across Central America. (SOPA Images/Alamy)*

In addition, there is still a weak environmental institutional framework, generally with insufficient political support. This results in insufficient budgets and personnel to combat pressures on biodiversity, mitigate environmental impacts and control illegal activities. It is reflected in the little attention given by the police and judiciary to environmental problems<sup>110</sup>. The portion of GDP devoted by central governments to environmental protection remains very limited: in 2016 it ranged from 0.07 % in Colombia to 0.43 % in Panama, for the sample of countries in the region evaluated by ECLAC<sup>111</sup>. There is a lack of studies on the effectiveness of these budget expenditures and their impact on biodiversity conservation and ecosystem services.

Finally, for a long time, insufficient attention has been given to discussions among stakeholders or to defending their rights within the elaboration of environmental legal and policy frameworks<sup>112</sup>. Without such processes, the legal instruments are not very efficient. For example, the governance of indigenous territories based on indigenous peoples' own institutions and norms is only beginning to be recognised in the development of better governance of natural resources. Most PAs in the region that overlap with indigenous territories were created without a

consultation process with the indigenous peoples, and under a model of state governance. To date, the PA systems of some countries do not officially recognise the role of community management (e.g. Guatemala) or their regulations restrict the way of life of indigenous peoples (e.g. in the Honduran Moskitia)<sup>113</sup>. In the region, 8 countries have signed ILO Convention 169 (Colombia, Costa Rica, Dominica, Guatemala, Honduras, Mexico, Nicaragua and Venezuela) and some, like Costa Rica, have adopted laws for the implementation of free prior and informed consent (FPIC) consultation.

In 2018, a promising step was taken with the adoption of the Escazú agreement (Regional Agreement on Access to Information, Public Participation and Access to Justice in Environmental Matters in Latin America and the Caribbean). It is the only binding agreement emanating from the United Nations Conference on Sustainable Development (Rio+20) and the first regional environmental agreement in Latin America and the Caribbean. However, to come into force, it must be ratified by 11 states. By mid-2020, it had been ratified by only 9 of them, of which 5 are in the region (Antigua and Barbuda, Nicaragua, Panama, Saint Vincent and the Grenadines, and Saint Kitts and Nevis).<sup>114</sup>

<sup>(110)</sup> IUCN (2013). Regional situation analysis: an updated perspective. Towards an efficient and effective 2013-2016 programme in Central America and the Caribbean. San José, Costa Rica: International Union for Conservation of Nature.

<sup>(111)</sup> <https://observatoriosocial.cepal.org/inversion/es/indicador/gasto-proteccion-medio-ambiente>

<sup>(112)</sup> UNEP (2012). Global Environment Outlook-5: Environment for the future we want. United Nations Environment Programme.

<sup>(113)</sup> Silvel E. (2017). Regional Synthesis: Governance of Indigenous Natural Resources in Mesoamerica. Natural Resources Governance Framework NRGF. MOPAWI - IUCN.

<sup>(114)</sup> <https://observatoriop10.cepal.org/en/treaties/regional-agreement-access-information-public-participation-and-justice-environmental>



The absence of efficient processes of agreement, planning, regulation and control allows the development of unsustainable productive and extractive practices, generating social and environmental conflicts. It also favours the existence of underhand practices and illegal networks.

One of the most striking governance problems is the uncertainty associated with legal rights to land ownership.<sup>115</sup> This encourages land trafficking and processes of land grabbing and illegal colonisation, often involving the forced displacement of indigenous populations and other small communities. It is a source of numerous conflicts at the local level, which must be resolved in order to guarantee sustainable territorial planning. In addition, insecurity of land tenure creates a considerable disincentive to invest in sustainable production systems. In politically sensitive areas, such as Laguna del Tigre and Petén (Guatemala), where many farmers lack legal title to their land, it is difficult for them to invest in sustainable resource management or to oppose outsiders entering to exploit the forest<sup>116</sup>.

### 2.3.3 Weaknesses in land management

Effective land-use planning would make it possible to control all the threats mentioned. However, attempts at land-use planning promoted by organisations such as the Inter-American Development Bank (IDB) and the World Bank (WB) at the end of the 20<sup>th</sup> century and beginning of the 21<sup>st</sup> century were shelved. Hundreds of plans were elaborated at different territorial scales, from national to municipal, but in none of the countries of Mesoamerica is their application well known<sup>117,118</sup>. It is estimated that the situation is similar in most Caribbean countries.

Too often, public development policies overlap with or prevail over land-use planning, where it exists. Productive and extractive activities are promoted that conflict with conservation efforts, and even within PAs.

It should be noted that land-use planning processes are generally not adapted to the requirements of minority groups (peasant and indigenous communities and artisanal fishermen, among others), nor are they equitable. Many land administration projects are based on a simple territorial demarcation and a title issued in the name of the group<sup>119</sup>. Due attention must be paid to consultation and accompaniment for the genuine empowerment of these groups on their territories.

## 2.4 CROSS-CUTTING THEMES

### 2.4.1 Climate change

The countries of the region are not major emitters of greenhouse gases, and most of their emissions are due to deforestation. It is estimated that Central America produces less than 0.3 % of global emissions, if land-use change is not accounted for, and less than 0.8 % of total gross emissions<sup>120</sup>. The Caribbean's contribution is even lower. However, climate change (CC) affects both biomes and economies of the region, generating direct and indirect impacts.

Environmental degradation and CC compound each other's impacts. On the one hand, the loss of ecosystem service production capacity in natural landscapes increases the vulnerability of their populations to the effects of CC. For example, removing vegetation cover, which helps prevent flooding and landslides, presents a risk to populations, as does the removal of mangroves, which absorb 70-90 % of the force generated by hurricane waves. On the other hand, CC contributes to environmental degradation by modifying hydrological and temperature regimes and by increasing the frequency and intensity of extreme events (droughts, floods, landslides, hurricanes, etc.), among others.

Central America and the Caribbean are among the regions most exposed to natural disasters in the world, due to their geographical location. Damage from natural disasters in the Central American region between 1950 and 2018 cost USD 86.3 billion, of which weather-related disasters accounted for 69 %<sup>121</sup>. In the insular Caribbean, 328 natural disasters were recorded between 1990 and 2014, most of which were weather-related. They claimed nearly 18 000 lives and caused losses of over USD 31 billion (not counting the effects of the 2010 earthquake in Haiti). The effect on the local economy is often critical in small island states, as a result of their small size, lack of economic diversity and the concentration of population and assets in vulnerable areas (coasts). For example, Hurricane Ivan in 2004 caused damage in Grenada that cost over 200 % of national GDP<sup>122</sup>.

Beyond natural disasters, the region is one of the most vulnerable in the world to climate change. This is due to its high climate variability and the institutional and socio-economic weaknesses in its various countries<sup>123</sup>. The effects of climate

<sup>(115)</sup> UNEP (2012). Op cit.

<sup>(116)</sup> Critical Ecosystem Partnership Fund (2004). Ecosystem Profile: Northern Region of the Mesoamerican Biodiversity Hotspot Belize, Guatemala, Mexico.

<sup>(117)</sup> Interview conducted with Dr Luis Ramos in the context of the preparation of this report. 2016.

<sup>(118)</sup> UNDP (2010). Regional Human Development Report for Latin America and the Caribbean 2010: Acting on the Future: Breaking the Intergenerational Transmission of Inequality. San José, Costa Rica: United Nations Development Programme. 208 pp.

<sup>(119)</sup> UNEP (2012). Global Environment Outlook-5: Environment for the future we want. United Nations Environment Programme.

<sup>(120)</sup> ECLAC (2011). The Economics of Climate Change in Central America: 2011 Technical Report, Mexico City.

<sup>(121)</sup> ECLAC (2019). A look at the countries of the Mesoamerica Integration and Development Project. Mexico. 116 pp. Available at [https://repositorio.cepal.org/bitstream/handle/11362/44729/1/S1900631\\_es.pdf](https://repositorio.cepal.org/bitstream/handle/11362/44729/1/S1900631_es.pdf)

<sup>(122)</sup> Smith R. (2015). The Caribbean and the post-2015 development agenda. Economic Commission for Latin America and the Caribbean (ECLAC), Subregional Headquarters for the Caribbean. *Studies and Perspectives* 43.

<sup>(123)</sup> FAO (2015a). Disaster Risk Programme to strengthen resilience in the Dry Corridor in Central America.

change are most strongly felt in activities that are highly dependent on ecosystem services, such as agriculture, fisheries and tourism, which are key to the region's economy<sup>124</sup>.

According to forecasts, many areas in the region with a semi-humid climate could become semi-arid or even arid by the end of the 21<sup>st</sup> century. The region's wetlands and rainforest areas are expected to shrink in favour of dry forests and other more arid ecosystems.<sup>125</sup> Changes in the structure of dry forests can already be observed, with species with more succulent leaves replacing those with deciduous leaves. Runoff will decrease even as rainfall increases, due to greater evapotranspiration. Reduced leaf area in forests and changes in the water balance are expected to have considerable impacts on biodiversity and the ecological functioning of land systems<sup>126</sup>.

One of the services that will be most rapidly affected is the availability of water in the quantity and quality required for human consumption, crop irrigation, hydropower generation and the maintenance of aquatic ecosystems. The effects of CC, compounded by environmental degradation and the growth of activities with high demand (agriculture, mining, tourism, etc.), are already affecting water supply: in the Caribbean, the islands of Barbados, Antigua, Barbuda and St. Kitts and Nevis are suffering from water shortages<sup>127</sup>.

Ensuring sustainable access to water is critical, especially in the dry forest biome, where the expected impacts of CC are combined with other strong pressures. Recurrent droughts, increased incidence of fire and more intense rainfall episodes are expected to result in severe flooding, which would affect degraded areas more intensely. Basic grain yields in the Central American Dry Corridor will be adversely affected.<sup>128</sup>

The spread of pests and diseases of crops, livestock and farm animals is another direct consequence of CC. Diseases have increased in many of the region's typical crops (banana, plantain, coffee, cocoa and corn), as a result of the increase in temperature and humidity<sup>129</sup>. All these factors represent a serious threat to food security.<sup>130</sup> The logging sector is also affected, such as from pests like the Southern pine beetle (*Dendroctonus*

*frontalis*), which has been attacking Honduran pine forests since 2014, due to prolonged droughts and more extreme heat waves that allow it to reproduce much faster<sup>131</sup>.

Finally, sea level rise and the death of coral reefs (with bleaching detected since 1998, due to water warming and acidification<sup>132</sup>) are other notable effects of CC, affecting the Caribbean islands and the coasts of the region.

## 2.4.2 Illegal activities and security problems

Security is an important issue to consider when planning biodiversity conservation processes. Protected areas and remnants of natural ecosystems are generally sparsely populated and poorly monitored. This makes them ideal cover for criminal networks, which engage in illicit activities such as trafficking in drugs, arms, people and wildlife, and illegal mining. Such activities are widespread in the region, although more common in the northern triangle (Guatemala, Honduras and El Salvador) and Mexico. They particularly affect cross-border and coastal-marine protected areas, which are used as transit routes, warehouses, production zones and/or laboratories. Illegal activities are drivers of deforestation, chemical contamination and other pressures on ecosystems and biodiversity. In addition, park rangers and local communities are highly exposed and PA governability is severely affected<sup>133</sup>. Usually, the only alternative for the scarce personnel who carry out the control and surveillance of these areas is not to approach perpetrators, as doing so would endanger their lives<sup>134</sup>.

More generally, land-grabbing processes (including in marine and coastal areas) endanger indigenous peoples and other nature defenders. In 2019, more than 200 environmental activists were killed worldwide, 64 in Colombia, 18 in Mexico and others in Honduras, Guatemala, Venezuela and Nicaragua<sup>135</sup>. Many of the killings occur in remote areas, so the actual death toll is likely to be much higher. The victims include many indigenous leaders and community leaders (almost 40 % of the victims in 2015 were indigenous)<sup>136</sup>. Beyond the killings, many

<sup>(124)</sup> Uribe Botero, E. (2015). Climate change and its effects on biodiversity in Latin America. ECLAC. United Nations. Euroclima, European Union. Santiago, Chile. 84 pp.

<sup>(125)</sup> ECLAC (2011). The Economics of Climate Change in Central America: 2011 Technical Report, Mexico City.

<sup>(126)</sup> BIOMARCC-SINAC-GIZ (2013). Impacts of climate change on biodiversity and ecosystem services with emphasis on protected wildlife areas: State of the art synthesis 2009-2011. San José-Costa Rica. 39 pp.

<sup>(127)</sup> IUCN (2013). Op cit.

<sup>(128)</sup> FAO (2015a). Op cit.

<sup>(129)</sup> Vergara W., A.R. Rios, P. Trapido and H. Malarín (2014). Agriculture and future climate in Latin America and the Caribbean: systemic impacts and possible responses. Inter-American Development Bank. Discussion Paper IDB-DP-329.

<sup>(130)</sup> Inter-American Development Bank (IDB) (2010). Vulnerability and adaptation to climate change: initial diagnosis, progress, gaps and potential lines of action in Mesoamerica. Washington DC: Inter-American Development Bank.

<sup>(131)</sup> Poder Ejecutivo (13 January 2016). Decreto Ejecutivo Número PCM-003-2016. *La Gaceta* (33 932). República de Honduras, Tegucigalpa, M. D. C. Available at <http://extwprlegs1.fao.org/docs/pdf/hon167493.pdf>

<sup>(132)</sup> Reef Base (2014). Global Information System for Coral Reefs, GIS & Maps. Available at [www.reefbase.org/main.aspx](http://www.reefbase.org/main.aspx)

<sup>(133)</sup> Radachowsky J. (2016). Contributions made in the framework of the consultation process for the preparation of this report.

<sup>(134)</sup> Murillo A. (2016). Drug trafficking makes protected areas its own. Special edition: National Parks. *University Weekly*, 24 August 2016.

<sup>(135)</sup> Global Witness (2020). Defending Tomorrow: The climate crisis and threats against land and environmental defenders. 52 pp. Available at: <https://www.globalwitness.org/en/campaigns/environmental-activists/defending-tomorrow/>

<sup>(136)</sup> Global Witness (2015). On dangerous ground. The deadly environment of 2015: murder and criminalization of earth and environmental defenders around the world. Available at <https://www.globalwitness.org/en/campaigns/environmental-activists/dangerous-ground/>





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*Somali and Nepalese illegal migrants transit north through the Darien Pass. The lack of infrastructure, low population density and the extent of Central America's intact tropical forest blocks create favourable conditions for human and drug trafficking and other illicit activities. (Jan Sochor/Alamy Stock photo)*

environmental defenders are subject to death threats, blackmail, illegal surveillance, cyber-attacks, sexual assaults, wrongful arrest and judicial harassment. Agro-industry and mining are the sectors most linked to violence, followed by hunting, illegal logging and hydroelectric infrastructure.

Drug trafficking also contributes to land grabbing. In Peten (Guatemala) and Mosquitia (Honduras), for example, most of the area deforested for pasture does not have enough cattle to justify the expenses that the owners must incur. The use of grasslands as airstrips is common. There is evidence that cattle ranching is a pretext for land grabbing and demonstrating licit

activities, although the main activity is drug trafficking<sup>137</sup>. In some places, it is a more important driver of deforestation than the meat market and prompts speculation on land prices.

It should be noted that improved security in an area does not necessarily mean better conservation. It can allow for a greater influx of farmers and thus a further expansion of agriculture, as in the case of Colombia since the peace agreements with the Revolutionary Armed Forces of Colombia (FARC)<sup>138</sup>.

<sup>(137)</sup> Radachowsky J. (2016). Op cit.

<sup>(138)</sup> Armenteras, D., L. Schneider and L.M. Dávalos (2019). Fires in protected areas reveal unforeseen costs of Colombian peace. *Nature ecology & evolution*, 3(1), p. 20.







# #3

## Conservation actors and protected areas ►

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*Queen conch (Lobatus gigas). This marine mollusc used to be widely fished in the Caribbean for its meat and its shell, a popular souvenir. Now considered vulnerable, the species has become so rare that it can no longer fulfil its predatory role controlling the population of algae such as sargassum (Sargassum spp.), large volumes of which wash up on beaches, causing losses to the fishing and tourism sectors.*  
(RGB Ventures/SuperStock/Alamy)





## #3 \_ Conservation actors and protected areas

### 3.1 CONSERVATION ORGANISATIONS AND NETWORKS

#### 3.1.1 Interstate agencies

Many environmental conservation efforts in the region have been promoted by inter-state organisations, within the framework of broader thematic and political agreements. These bodies have been generating policies at regional scales, overcoming jurisdictional barriers, and thus contributing to conservation at a supranational scale. In some cases, they are also responsible for the implementation of programmes and projects.

**The Central American Integration System (SICA)**, its acronym in Spanish<sup>(139)</sup>. Created in 1991 by the Organisation of Central American States (ODECA), it is composed of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama and the Dominican Republic. It has different bodies responsible for supervising the harmonisation of legislation and policies related

to specific issues, such as the Regional Committee on Water Resources (CRRH), the Organisation of the Fishing and Aquaculture Sector of the Central American Isthmus (OSPESCA) and the Coordination Centre for the Prevention of Natural Disasters in Central America (CEPRENAC). In the field of conservation, it has the **Central American Commission on Environment and Development (CCAD)**<sup>(140)</sup>, which comes under the authority of the Council of Ministers of the Environment. It has implemented various strategies, among which the Regional Environmental Strategy Framework 2015-2020 (ERAM, currently being updated) stands out. It was prepared on the basis of a broad participatory process with the countries' ministries of environment, the private sector, NGOs, civil society organisations and academia. In environmental matters, it also has regional strategies on the issues of climate change, conservation and the sustainable use of biodiversity, management of forest ecosystems, etc. Significant progress has been made in the coordination and regionalisation of projects, such as the Mesoamerican Biological Corridor and the protection of certain animal species.

<sup>(139)</sup> <https://www.sica.int/>

<sup>(140)</sup> <https://www.sica.int/ccad/>



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*Meeting of the Central American Integration System (SICA) council of ministers, Guatemala. Through its Central American Commission for Environment and Development (CCAD), SICA is a key body in designing and promoting conservation strategies at large landscape scales in the Central American region. (© Minex Guatemala/Flickr)*

**The Caribbean Community (CARICOM)**<sup>141</sup>: Founded in 1973, this is composed of Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Lucia, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago. Activities related to the environment are particularly focused on adaptation to climate change, a key issue for the Caribbean islands, according to the Caribbean Community Strategic Plan 2015-2019 (update planned for 2020). In fact, CARICOM is supported by the Caribbean Community Climate Change Centre (CCCCC)<sup>142</sup>, which has been coordinating climate change actions in the Caribbean region since 2005. It was responsible for preparing the Regional Framework for Achieving Development Resilient to Climate Change in 2009 and an Implementation Plan in 2012. CARIFORUM associates the Dominican Republic with the countries of CARICOM.

**The Association of Caribbean States (ACS)**<sup>143</sup>: Established in 1994, this is composed of 25 Member States and 7 Associate Members. It seeks to create an enlarged economic space in the region, preserve the environmental integrity of the Caribbean Sea (considered as the common heritage of the peoples of the region) and promote the sustainable development of the Greater Caribbean. Sustainable tourism and natural disasters are two of its focal areas. The ACS Sustainable Tourism Work Programme seeks, among other things, to achieve the establishment of the Sustainable Tourism Zone of the Caribbean (STZC). As for the Disaster Risk Reduction Directorate, it serves to strengthen cooperation among the organisations responsible for planning and disaster relief in the region. Among its initiatives is the 'Green response to disasters' project, which responds to the need to take sustainable development into account, even in crisis situations. It also co-finances with ECLAC a regional master's degree in sustainable development, with emphasis on disaster risk reduction.

**The Organization of Eastern Caribbean States (OECS)**<sup>144</sup> was created in 1981, to strengthen regional integration in the Caribbean, including in the areas of resilience, social equity and foreign policy, associating six independent countries and three territories of the United Kingdom. It seeks to ensure sound policies and good governance of environmental issues in the area covered, through several specific units: the Ecosystems and Biodiversity Management Unit, the Disaster Risk Management and Climate Change Unit, the Sustainable Energy Unit, the Ocean Governance and the Fisheries Unit.

### 3.1.2 International relations and the environment

#### International partners

International cooperation partners, both multilateral and bilateral, have developed various channels of cooperation to support the region and its states, including political and trade agreements, technical cooperation, programmes financed by grants or loans, etc. They also support civil society organisations and collaborate with private sector actors, or even implement their own programmes. These partners remain a stable and vital source of funding for the environment in Central America and the Caribbean.

Among the main multilateral political organisations that contribute to conservation in the region are:

The **European Union (EU)** has been a key partner of SICA and CARICOM, as well as their main source of funding, establishing partnership agreements and multi-year cooperation frameworks with both regional organisations. In both the region and its separate countries, the EU has supported sustainable development through political dialogue and partnerships, in addition to projects linked to, among others:

- biodiversity conservation, management of protected areas and ecosystem restoration;
- sustainable forest management and REDD+;
- adaptation to climate change;
- boosting the green economy, and sustainable agriculture and tourism;
- linking clean energy and sustainable development;
- environmental governance and civil society capacity building.

The EU has signed an Association Agreement with Central America and another with Mexico, and an Economic Partnership Agreement with CARIFORUM<sup>145</sup>, all of which govern trade and political relations, and all include sustainable development clauses. The negotiation of a Voluntary Partnership Agreement with Honduras in the framework of the FLEGT policy was completed in 2017. In terms of investment for development, the EU is making the Latin America Investment Facility (LAIF) and the Caribbean Investment Facility (CIF) available to the region's countries. In addition, the EU has sought to strengthen collaboration between Caribbean countries and the overseas territories of its Member States.

<sup>(141)</sup> <https://caricom.org/>

<sup>(142)</sup> <https://www.caribbeanclimate.bz/>

<sup>(143)</sup> <http://www.acs-aec.org/index.php?q=es>

<sup>(144)</sup> <https://oeccs.org/en/>

<sup>(145)</sup> A body comprising the Caribbean States that are signatories to the Georgetown Agreement establishing the African, Caribbean and Pacific Group of States (ACP). Available at <https://caricom.org/>



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*A field visit to Costa Rica as part of a South-South Knowledge Exchange between Côte d'Ivoire and Costa Rica in the framework of UN-REDD Programme. (© UN-REDD Programme)*

The **United Nations'** (UN) system, in particular the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the Food and Agriculture Organisation (FAO), are developing major programmes in the region that contribute in many ways to biodiversity conservation, be it through, for example, the integration of biodiversity management into development planning and activities of productive sectors, the strengthening of protected areas, climate change adaptation and mitigation, etc.

There are also several **bilateral cooperation agencies** that promote sustainable development initiatives, among which are the French Global Environment Facility (FFEM), the French Development Agency (AFD), the German Agency for Technical Cooperation (GIZ), the German development bank KfW, the Danish International Cooperation Agency (DANIDA), the Spanish Agency for International Development Cooperation (AECID), the United States Agency for International Development (USAID) and the cooperation agencies of Canada, Japan and other countries. DANIDA and GIZ, for example, provide support for several projects linked to the Mesoamerican Biological Corridor, climate change, and REDD+. It should be noted that USAID investments are often channelled through US NGOs.

## Development banks

Several development banks are active in the region:

The **European Investment Bank (EIB)** and other development finance institutions of EU Member States have a portfolio of programmes and investments, supporting sustainable development in the region, with a significant proportion of investments relevant to climate change adaptation and mitigation.

The **World Bank (WB)** supports, among others, investments for the management of protected areas, the integration of biodiversity conservation into productive landscapes and, in some countries, the design of sustainable financing schemes for biodiversity conservation such as payments for environmental services. It is also supported by policy advice on cleaner development pathways, the reduction of industrial pollution and the promotion of "green cities".

The **Inter-American Development Bank (IDB)**, of which one of the most relevant programmes is the Biodiversity and Ecosystem Services (BSE) programme, which supports countries in the region to:

- integrate the value of biodiversity and ecosystem services into key economic sectors;
- protect priority regional ecosystems;
- promote effective environmental governance and policies;
- create new sustainable development business opportunities.

It works particularly with the agriculture, water, sanitation, transport and tourism sectors.



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*Mangrove reforestation in Belle Anse, Haiti. An EU-funded project to consolidate participatory governance in the Parc National Naturel Lagon des Huitres includes the restoration of degraded coastal ecosystems as a nature-based solution for climate change adaptation. (© EU Delegation, Port-au-Prince)*



The **Caribbean Development Bank (CDB)** focuses on reducing poverty and inequality in the Caribbean subregion. It also implements, among others, the Adaptation Fund (AF)<sup>146</sup> for this same subregion, financing projects focused on strengthening resilience and adaptation to climate change.

The **Central American Bank for Economic Integration (CABEI)**<sup>147</sup> emerged in 1961 as the financial arm for Central American integration and works closely with SICA. It established environmental sustainability as a cross-cutting issue in its institutional strategy 2015-2019, with a focus on financing actions for climate change adaptation and mitigation. For example, it implements the Green Development Fund established by the EU for SICA countries.

### Environmental funds

Environmental funds have developed at a global level and in some countries of the region, to the point of representing an important alternative for mobilising financial resources from national and international sources, and channelling them to states, civil society and even other regional or global financial mechanisms. They make use of different innovative processes for mobilising funds such as: debt-for-nature swaps, establishment of trust funds, competitive funds, programme and project funds and mechanisms for generating their own resources in different conservation processes (mainly in PAs). In addition to managing certain funds, some directly implement environmental programmes and projects.

Among the international environmental funds active in the region, the following stand out:

The **Global Environment Facility (GEF)** is financed by many countries and administered by the WB. It is the financial mechanism of the international conventions for the environment. Its current biodiversity investment strategy (under GEF-7)<sup>148</sup> contributes to the following objectives:

- integrating biodiversity concerns into all sectors, in both landscapes and seascapes;
- addressing direct threats to protect habitats and species;
- further developing biodiversity policy and institutional frameworks.

It has been the largest international donor to biodiversity conservation in the region. In particular, it has helped protect the Maya Biosphere Reserve and strengthen the capacity of indigenous communities to protect and manage their natural and cultural resources in the Mesoamerican Biological Corridor. It has also financed energy projects in Haiti, Barbados and the Bahamas, and contributed to the Protected Areas Fund in Mexico (FMCN). It has also supported, *inter alia*, the preparation of national biodiversity conservation strategies and action plans in several countries of the region.

The **Critical Ecosystem Partnership Fund (CEPF)**, created in 2000, brings together several governmental, multilateral and civil society organisations, including the EU, GEF, the Government of Japan, AFD, Conservation International and the WB.

<sup>(146)</sup> <https://www.adaptation-fund.org/>

<sup>(147)</sup> <https://www.bcie.org/>

<sup>(148)</sup> [https://www.thegef.org/sites/default/files/documents/GEF\\_BiodiversityStrategy%202018\\_CRA\\_bl1\\_0.pdf](https://www.thegef.org/sites/default/files/documents/GEF_BiodiversityStrategy%202018_CRA_bl1_0.pdf)

CEPF provides grants to strengthen NGOs, especially small local organisations, to help protect biodiversity hotspots. Between 2002 and 2011 it provided support in the Mesoamerica hotspot<sup>149</sup>, and since 2010 it has been active in the insular Caribbean<sup>150</sup>.

The **Caribbean Biodiversity Fund (CBF)**, established in 2012, is funded primarily by the GEF, the Government of Germany and the WB. It is a regional trust fund, which aims to provide a sustainable flow of resources to support activities that contribute substantially to biodiversity conservation within national protected area systems or in any other environmentally significant areas of the insular Caribbean.

In addition, there are numerous national environmental funds in both Central America and the Caribbean (at least 15 in total). As examples, we can mention:

The **Protected Areas Conservation Trust (PACT)**: This is the National Environmental Fund of Belize, which supports projects for the sustainable management of protected areas. It is financed mainly by a conservation tax paid by tourists upon their departure from the country and a commission of 20 % of cruise ship passenger fares.

The **Foundation for the Conservation of Natural Resources (Natura)** focuses on the protection and integrated management of priority watersheds in Panama, through environmental and economic assessment, participatory processes and fund management. Among other things, it supports Green Coalitions, which are alliances with the private sector.

The **Environmental Foundation of Jamaica (EFJ)** works in Jamaica's major watersheds and public protected areas. It finances environmental protection initiatives by managing grants, fostering partnerships with donors for sub-grants and managing endowment and sinking funds.

### NGOs and private foundations

International NGOs support conservation strategies and implement projects and programmes, either directly or through local partners. They are also important actors because of their role in generating information, communication and political advocacy. The largest operate mainly through resources channelled through donations and endowments, but many rely on funding from international cooperation agencies. Others are private foundations and have self-financing capacity.

Among the most relevant international NGOs in Central America and the Caribbean are the Wildlife Conservation Society (WCS), Conservation International (CI), The Nature Conservancy (TNC),

the World Wildlife Fund for Nature (WWF), Wetlands International (WI), the Caribbean Natural Resources Institute (CANARI) and the Island Resources Foundation (IRF). There is also the International Union for Conservation of Nature (IUCN), formed by numerous NGOs and states. In addition, several private foundations fund conservation programmes in landscapes and protected areas in the region, including the Gordon and Betty Moore Foundation, Packard Foundation, Kellogg Foundation, Sharp Foundation, MacArthur Foundation and Ford Foundation.

Apart from these international actors, there are national and local NGOs in each of the region's countries that are too numerous to detail here. They play a very important role in political advocacy, training and implementation of environmental education activities, co-management of PAs, as well as their control and protection, sustainable production, promotion of environmentally friendly technologies, research and others. It is also worth highlighting the role of organised communities' participation, which makes conservation and sustainable use of biodiversity efforts more effective and promotes awareness processes that have multiplier effects. The available capacity and proximity of these actors to local challenges makes them valuable partners at the local and national level.

## 3.1.3 Networks, alliances and initiatives of regional relevance

### Alliances and networks

Partnerships are more necessary than ever to achieve conservation goals. In this sense, collaboration between institutions and civil society organisations is vital to ensure that decisions are as democratic and approaches as diverse as required for intervention processes. Numerous networks set up to bring together the different actors have succeeded in strengthening conservation efforts by developing synergies.

Among the networks and alliances that are not specific to this region but which are nevertheless relevant are: the Latin American Technical Cooperation Network on National Parks, Other Protected Areas, Wild Flora and Fauna (REDPARQUES)<sup>151</sup>, the Latin American and Caribbean Network of Environmental Funds (RedLAC)<sup>152</sup>, the Latin American Alliance for the Conservation of Private Natural Reserves, and the Ibero-American and Caribbean Network of Man and the Biosphere Committees and Biosphere Reserves (IberoMAB)<sup>153</sup>.

At the regional level, the **Biodiversity Partnership Mesoamerica (BPM)** stands out. Created in 2012, it is made up of

<sup>(149)</sup> <https://www.cepf.net/our-work/biodiversity-hotspots/mesoamerica>

<sup>(150)</sup> <https://www.cepf.net/our-work/biodiversity-hotspots/caribbean-islands>

<sup>(151)</sup> <http://redparques.com/>

<sup>(152)</sup> <https://redlac.org/>

<sup>(153)</sup> <http://www.unesco.org/new/es/natural-sciences/environment/ecological-sciences/man-and-biosphere-programme/networks/iberomab/>





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*A boatman in mangroves of the Samaná peninsula, Dominican Republic. The country was among the first to join the Caribbean Biological Corridor initiative and its Ministry of the Environment and Natural Resources has incorporated a regional vision of biodiversity conservation into its planning. (Michael Dwyer/Alamy)*

several academic organisations, NGOs, and national and international corporations. The alliance works to maintain and rehabilitate the region's in-situ biodiversity, supports the establishment and internalisation of national, regional and international agreements on biodiversity, and promotes the adoption of sustainable production methods. It provides platforms for knowledge generation and capacity building, and facilitates the exchange of experiences<sup>154</sup>.

Other institutions and organisations are making efforts to produce information in their area of influence and make it available to the public on virtual platforms, contributing to strengthening large-scale coordination throughout the region. Initiatives of great interest are being developed, such as the EU's BIOPAMA programme, which supports PA observatories in the Caribbean, and the CONABIO geo-information system in Mexico<sup>155</sup>, which has scientific, institutional and cartographic data online.

### Biological corridors

Among the initiatives with the greatest potential for biodiversity conservation, at the landscape scale, are biological corridors. Two major corridors are being consolidated in the region.

**Mesoamerican Biological Corridor (MBC):** Created in 1997, this covers Central America and Mexico, and is made up of the linked Central American System of Protected Areas, with adjacent buffer zones and multiple-use zones. The MBC has served

as a regional platform around which Central American countries and numerous donors have gathered to support the protection and sustainable development of its key habitats. To reinforce this dynamic, together with the 8 Central American countries, SICA/CCAD launched the 5 Great Forests of Mesoamerica alliance at the December 2019 UN climate conference in Madrid.<sup>156</sup> A broad coalition of indigenous peoples, local communities and civil society organisations support and form part of the initiative.

**Caribbean Biological Corridor (CBC)**<sup>157</sup>: This initiative was launched in 2007 and adopted by the Governments of Cuba, Dominican Republic, Haiti and Puerto Rico, with the support of UNEP and the EU. Jamaica is an observer country, and the initiative aims at the successive integration of the remaining islands. It constitutes the first step in a partnership for the conservation of marine and terrestrial biodiversity in the insular Caribbean. In the selection of CBC conservation targets, the criteria of vulnerability and resilience to climate change, which are key issues in the subregion, were considered.

### Other networking initiatives

**Mesoamerican Integration and Development Project (PM)**<sup>158</sup>: Created in 2008, this is a mechanism for regional co-operation and integration involving 10 countries (Belize, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama). Participating

<sup>(154)</sup> <http://www.bpmesoamerica.org>

<sup>(155)</sup> <http://www.conabio.gob.mx/informacion/gis/>

<sup>(156)</sup> [https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/13582/Mesoamerica-Commits-to-Protect-its-Five-Great-Forests-as-Part-of-Regions-Climate-Action-Plan-During-UN-Conference-in-Madrid.aspx?\\_ga=2.171889312.121432744.1629505435-1527967796.1608218902](https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/13582/Mesoamerica-Commits-to-Protect-its-Five-Great-Forests-as-Part-of-Regions-Climate-Action-Plan-During-UN-Conference-in-Madrid.aspx?_ga=2.171889312.121432744.1629505435-1527967796.1608218902). Accessed 22 August 2021.

<sup>(157)</sup> <http://cbcbio.org/>

<sup>(158)</sup> <http://www.proyectomesoamerica.org>

governments and various multilateral organisations provide the finance. In the environmental area, it follows a Mesoamerican strategy for environmental sustainability and works closely with CCAD. It has contributed to the implementation of the MBC's master plan, to the consolidation of the virtual centre of excellence in forest monitoring in Mesoamerica and to the climate services centre for Mesoamerica and the Caribbean. In the future it seeks to establish a regional centre for forest fire management operations.

**Caribbean Challenge Initiative:** This was launched in 2008 and involves 10 Caribbean countries (Bahamas, British Virgin Islands, Dominican Republic, Grenada, Jamaica, Puerto Rico, St Kitts and Nevis, St Lucia, and St Vincent and the Grenadines). They have committed to conserving at least 20 % of their marine and coastal environments by 2020, as part of their national systems of protected areas. The initiative, coordinated by TNC, includes the establishment of sustainable financing mechanisms at the national and regional levels for PA management, in collaboration with the private sector. Various donors and NGOs have joined the initiative to provide financial and technical support<sup>159</sup>.

### 3.1.4 Research and training

Academic and research institutions throughout the region are involved in biodiversity conservation, at the level of training, research and policy advice. Examples include the Tropical Agricultural Research and Higher Education Centre (CATIE)<sup>160</sup>, the Organization for Tropical Studies (OTS)<sup>161</sup> and the Latin American School of Protected Areas (ELAP)<sup>162</sup>, all based in Costa Rica, and the Centre for Resource Management and Environment (CERMES) of the University of the West Indies in Barbados.

This is in addition to the efforts of numerous NGOs and other organisations with expertise in a wide range of disciplines. Conservation, particularly under the landscape approach, requires a multidisciplinary and multisectoral vision. All sectors of society and the relevant scientific disciplines must be involved in order to interpret in a comprehensive manner what is happening in the territory, to properly balance the proposals and to promote interventions and change.

To date, there are still major gaps and a significant fragmentation of information on land management and

biodiversity. In particular, work on the science-policy interface is lacking. At the international level, a good example of an initiative to streamline this interface is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)<sup>163</sup>. Most countries in the region are members or observers of this platform, which produces policy-relevant information, such as the regional assessment report on biodiversity and ecosystem services for the Americas in 2018<sup>164</sup>.

With respect to PA management, specifically, several training courses are offered in the region. Among the best known are the training courses offered by CATIE and the Latin American School of Protected Areas at the University for International Cooperation in Costa Rica, as well as by DUMAC within the framework of its RESERVA training programme<sup>165</sup> and the National Ranger College in Mexico. Mention should also be made of the REDPARQUES Capacity Building Group, which seeks to implement the recommendations of the Strategic Framework for Capacity Building in PAs and other conservation areas (2015-2025) in LAC<sup>166</sup>. In the Caribbean, many initiatives to improve PA management are also undertaken through projects implemented by governments and financed by multilateral organisations, such as 'Conserving biodiversity and reducing habitat degradation in protected areas and their areas of influence project' (UNDP) and 'Improving forest and protected areas management in Trinidad and Tobago' (FAO).

## 3.2 PROTECTED AREAS SYSTEMS

### 3.2.1 Coverage

There are 1 438 officially declared or designated national land or coastal PAs in the region. There are also 91 international PAs, including 28 biosphere reserves, 49 Ramsar wetlands of international importance, and 14 World Heritage Sites<sup>167</sup>.

For those PAs of which the management category is known, 18 % are category VI (managed protected area), 15 % are category IV (habitat and species management area) and 10 % category II (national parks). If sorted by area, most correspond to the category of national parks (21 %), followed by managed protected areas (18 %).

<sup>(159)</sup> Declaration of Leaders of the Caribbean Challenge Initiative (2013). Caribbean Challenge Initiative. Political and Business Leaders Summit. Necker Island, British Virgin Islands. 17 May 2013.

<sup>(160)</sup> <https://www.catie.ac.cr>

<sup>(161)</sup> <https://tropicalstudies.org/>

<sup>(162)</sup> <https://uci.ac.cr/fad/>

<sup>(163)</sup> <https://ipbes.net/>

<sup>(164)</sup> <https://ipbes.net/assessment-reports/americas>

<sup>(165)</sup> <http://www.dumac.org/dumac/habitat/esp/proyectos04a.htm>

<sup>(166)</sup> IUCN-WCPA (2015). Strategic Framework for Capacity Building in Protected Areas and other Conservation Territories 2015-2025, 33 pp. Available at: <https://portals.iucn.org/library/sites/library/files/documents/Rep-2015-005-Es.pdf>

<sup>(167)</sup> IUCN – UNEP-WCMC (2016). The World Database on Protected Areas (WDPA). Available at [www.protectedplanet.net](http://www.protectedplanet.net)





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*A scientist collects data from sensors measuring emissions of oxygen and carbon dioxide from the rainforest on Barro Colorado Island, Panama. Academic and research institutions throughout the region are involved in biodiversity conservation, in training, research and policy advice. (Cyril Ruoso/Alamy)*

**TABLE 1** National land and coastal PAs in Central America and the Caribbean<sup>168</sup>

IUCN category	Number of PAs	% of the number of PAs	Area (km <sup>2</sup> )	% area
Ia - Strict nature reserve	15	1.04	4.224	1.59
Ib - Natural wilderness area	5	0.35	94	0.04
II - National park	151	10.50	56 667	21.31
III - Natural monument	46	3.20	3 585	1.35
IV - Habitat / species management area	219	15.23	10 371	3.90
V - Protected landscape and seascape	71	4.94	26 818	10.09
VI - Managed protected area	257	17.87	46 948	17.66
Not assigned	56	3.89	36 923	13.89
Not reported	618	42.98	80 251	30.18
Total	1 438	100	265 880	100

<sup>(168)</sup> Data source: Own elaboration based on IUCN and UNEP - WCMC (2016). We only worked with national protected areas that have a legal designation or declaration to avoid duplication of information, since the official WCMC database contains overlapping polygons and protected areas that have been proposed but not yet legally declared, so the information provided throughout the document on protected areas must take this into account. As indicated by Yedarena E. and J. Naveda (2014) in: The real extension of Venezuelan protected areas. IV World Parks Congress. Sydney, Australia: 'if one is to have a realistic estimate of how close or how far the world is from achieving Aichi target 11, then independent corroboration of official data provided by governments and strict adherence to the IUCN CBD definition of protected areas is necessary'.





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*The Apaneca-Illamatepec Biosphere Reserve in El Salvador is a mosaic of production zones dominated by shade coffee plantations, wetlands, dry broadleaf forests and pine forests. One of its core areas, the National Park of the Volcanoes, is a major natural attraction, home to lava vegetation zones that make it an important aquifer recharge area. (© Christian Kober/Alamy)*

In terms of land area covered by PAs, this corresponds to 28.2 % of Central America and 14.6 % of the insular Caribbean. For the sea (0-200 nautical miles from land), 2.1 % is covered by PAs in Central America and 1.2 % in the insular Caribbean<sup>169</sup>. The proportion of land surface subject to conservation varies widely in the countries and islands in the region. In the continental area, countries have the following coverage<sup>170</sup>: Venezuela (54 %), Nicaragua (37 %), Belize (38 %), Guatemala (20 %), Costa Rica (28 %), Honduras (24 %), Colombia (15 %), Panama (21 %), Mexico (14 %), and El Salvador (9 %). In the Caribbean islands, the highest coverage is found in Guadeloupe (70 %), Martinique (70 %), Turks and Caicos Islands (44 %), Bahamas (37 %), Trinidad and Tobago (31 %) and Dominican Republic (26 %). In contrast, some islands have very low coverage, such as Haiti (7 %), Puerto Rico (7 %) and Barbados (1.3 %).

In Central America and the Caribbean, land-based PAs are usually small: 35 % are between 0.1 and 99.9 km<sup>2</sup>, 11 % between 100 and 999.9 km<sup>2</sup>, and only 4 % are larger than 1 000 km<sup>2</sup>. Central America has 21 % of all PAs in LAC, but only 5 % of the protected area, while the Caribbean has 27 % of all LAC PAs and also 5 % of the area<sup>171</sup>.

Most of the PAs are isolated. Taking the distance of dispersion of land mammals as an indicator, Mexico and Panama have the lowest degree of connectivity in the region, while Venezuela has the highest<sup>172</sup>.

The large areas of remaining natural habitats and, in particular, the large stands of rainforest are found within PAs. This is the case for the Selva Maya (Guatemala and Mexico), the Río Plátano Biosphere Reserve (Honduras), the Bosawás Natural Reserve (Nicaragua), the Punta Gorda Indio Maíz Natural Reserve (Nicaragua) and Tortuguero National Park (Costa Rica). The same, although on a smaller scale, occurs in the PAs that make up the Caribbean Biological Corridor, such as Le Massif de la Hotte Biosphere Reserve (Haiti).

However, there is a disparity in the representation of ecosystems<sup>173</sup>. Tropical rainforests are the best represented with a total area of 173 345 km<sup>2</sup> protected, representing almost 23 % of the original area. This is followed in order of representation by mangroves (original area covered by PAs: 21 %), flooded grasslands and savannahs (17 %), deserts and xerophytic scrub (11 %), coniferous forests (10 %) and dry forests (5 %).

<sup>(169)</sup> Deguignet M., D. Juffe-Bignoli, J. Harrison, B. MacSharry, N. Burgess and N. Kingston (2014). 2014 United Nations List of Protected Areas. UNEP-WCMC, Cambridge, UK.

<sup>(170)</sup> Data from: WDPA. Available at: [www.protectedplanet.net](http://www.protectedplanet.net). Accessed 13 December 2019. In addition to data from the Single National Registry of Protected Areas. National Parks of Colombia, cut-off date: 21 October 2019.

<sup>(171)</sup> IUCN – UNEP-WCMC. 2016. Op cit.

<sup>(172)</sup> Santini L., S. Saura, and C. Rondinini. 2016. Connectivity of the global network of protected areas. *Diversity and Distributions* 22(2), pp. 199-211.

<sup>(173)</sup> We only worked with national protected areas that have a legal designation or declaration to avoid duplication of information, since the database contains overlapping polygons and protected areas that are not legally declared.

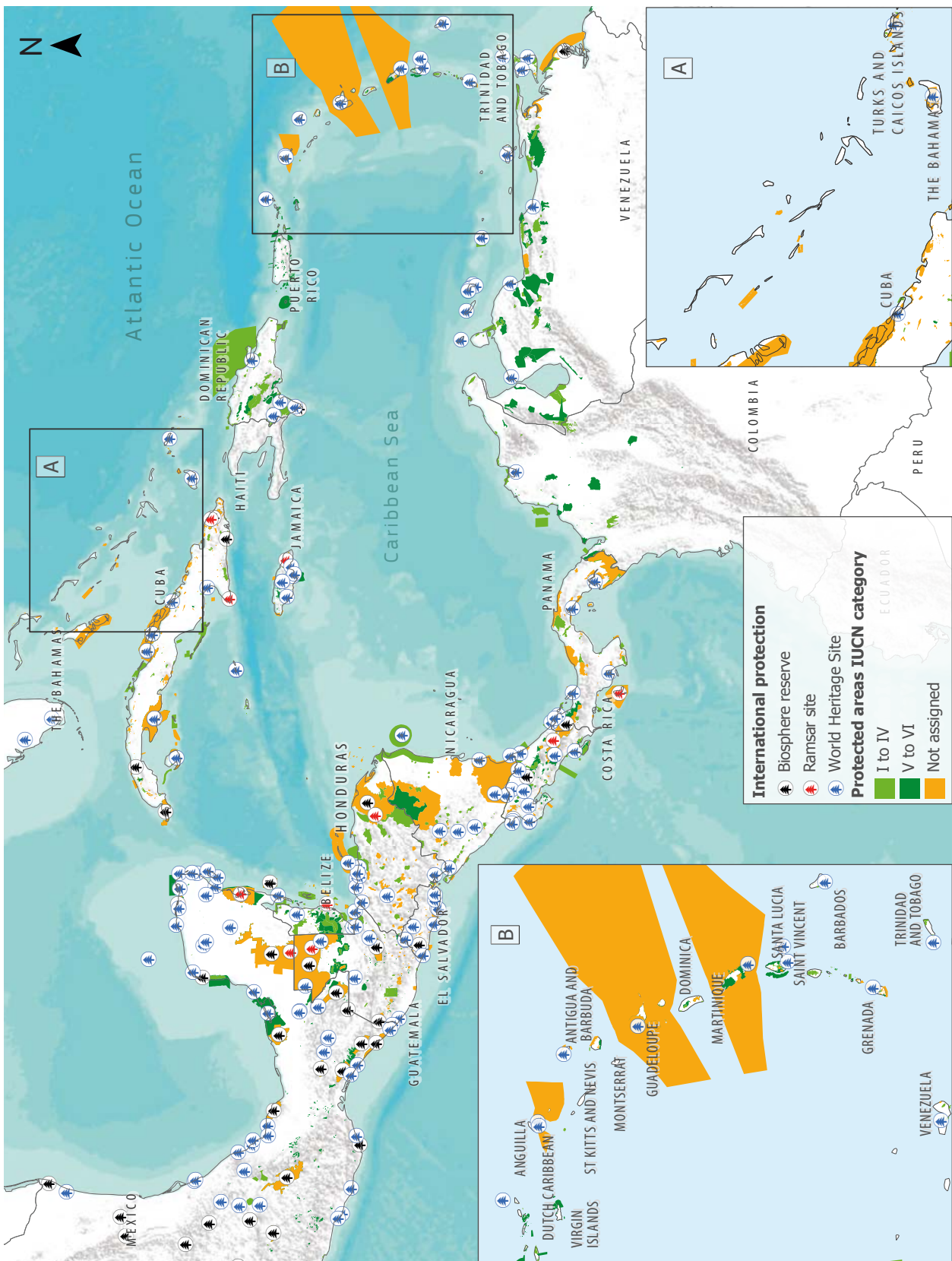


**TABLE 2** Area of national terrestrial and coastal PAs declared in Central America and the Caribbean, by management category and biome

Biome	Indicator	IUCN Category									
		Ia Strict nature reserve	Ib Natural wilder- ness area	II National park	III Natural monument	IV Habitat / species man- agement area	V Protected land- scape and sea- scape	VI Managed protected area	Not assigned	Not reported	Total
Tropical rainforest	Area (km <sup>2</sup> )	452	64	36 301	1 305	4 232	10 588	41 276	24 445	54 681	173 345
	% of total within PA	0.26	0.04	20.94	0.75	2.44	6.11	23.81	14.10	31.54	100
	% of potential area of the biome	0.06	0.01	4.74	0.17	0.55	1.38	5.39	3.19	7.14	23
Tropical hardwood dry forest	Area (km <sup>2</sup> )	27	15	3 656	200	1 603	6 935	2 511	1 899	4 769	21 615
	% of total within PA	0.13	0.07	16.92	0.93	7.42	32.08	11.62	8.78	22.06	100
	% of potential area of the biome	0.01	0	0.92	0.05	0.40	1.75	0.63	0.48	1.20	5
Tropical coniferous forest	Area (km <sup>2</sup> )	2 352	0.45	9 062	1 135	1 044	24	1 829	1 325	9 088	25 859
	% of total within PA	9.10	0	35.04	4.39	4.04	0.09	7.07	5.12	35.14	100
	% of potential area of the biome	0.94	0	3.61	0.45	0.42	0.01	0.73	0.53	3.62	10
Deserts and xerophilic scrub	Area (km <sup>2</sup> )	0.54	0	3 285	431	258	8 948	332	17	2 456	15 727
	% of total within PA	0	0	20.88	2.74	1.64	56.89	2.11	0.11	15.62	100
	% of potential area of the biome	0.0004	0	2.30	0.30	0.18	6.27	0.23	0.01	1.72	11
Mangroves	Area (km <sup>2</sup> )	0.54	0	3 285	431	258	8 948	332	17	2 456	15 727
	% of total within PA	0	0	20.88	2.74	1.64	56.89	2.11	0.11	15.62	100
	% of potential area of the biome	0	0	4.37	0.57	0.34	11.90	0.44	0.02	3.27	21
Flooded grasslands and savannahs	Area (km <sup>2</sup> )	0	0	401	12	375	0	334	0	21	1 143
	% of total within PA	0	0	35.11	1.02	32.82	0	29.20	0	1.85	100
	% of potential area of the biome	0	0	6	0	5.52	0	5	0	0	17

*Note: The data presented here is for illustrative purposes only and does not allow an exhaustive analysis of representativeness.*

**FIGURE 5** Protected areas in Central America and the Caribbean



Source: Prepared from IUCN – UNEP-WCMC Protected Planet (2020), <https://www.protectedplanet.net/en/thematic-areas/wdpa?tab=WDPA>



### 3.2.2 PA management and financing

Of the total number of PAs in the region, 75 % are managed by the state or other national or regional government agency, 5 % are managed by local communities, 8 % by private owners, 5 % by NGOs or other non-profit organisations, and 7 % are managed jointly by the government and other agencies.<sup>174</sup>

All countries have national PA systems, which are governed under different institutional structures, laws and policies, although in general the environment ministries are responsible. In Colombia and Mexico, in addition to the national system, there are regional and/or departmental PA systems to achieve a more flexible and local impact in countries with larger territories. Although a great effort has been made to create PAs and develop regulations for their integrated management, a number of challenges related to their management and financing have yet to be overcome, to ensure that they meet their objectives. In fact, some of the region's PAs still do not have a legal designation, which makes their management and access to resources more difficult. Even in legally recognised PAs, there is generally a lack of personnel to plan, manage or patrol, insufficient personnel training and insufficient investment in infrastructure to attract tourists. Furthermore, efforts to accompany local communities in sustainable resource management and conduct research studies are limited.

Many of the deficiencies in PA management in the region derive from their funding deficit and the inefficient use of funds. Government budgets constitute the largest part of PA funding in the region, followed by international cooperation and income generated at the sites themselves. In some cases, PAs are more dependent on international cooperation funds, particularly in El Salvador, Nicaragua and Panama, and in the small island developing states within the Caribbean. The average annual investment in Mesoamerica is USD 4.59/ha/year, a considerably higher amount than in South America (USD 1.39/hectare/year) but much lower than in the European Union (USD 43/hectare/year). Costa Rica is one of the countries in the region where public spending on PAs is the highest as a proportion of its GDP, but is still barely 0.055 %<sup>175</sup>.

In 2010, most PA systems in the region had less than 50 % of

their financial needs covered; Costa Rica is an exception. The funding gap is likely to increase, particularly given the heightened pressures on the region's environment, including climate change, which would justify increased conservation measures.

This lack of funding is paradoxical considering the importance of the services provided by PAs for the economy. For example, Mexico's PAs contribute at least USD 3.5 billion annually to the country's economy; every dollar invested generates USD 52 for the economy<sup>176</sup>. Likewise, tourism attracts approximately 1 million visitors per year to the PAs of Mesoamerica, especially to those of Costa Rica<sup>177</sup>, where about USD 700 million is generated annually from tourism<sup>178</sup>. In the Caribbean, where tourism is one of the main sources of income, 94 % of companies in the sector indicated that they depend on the environment, the conservation of which is partially based on PAs, for their subsistence<sup>179,180</sup>.

For a sample of countries evaluated in 2010<sup>181</sup>, the relative strength of financial planning for PAs was:

1. relatively strong, 50 % or more: Costa Rica, Cuba and Colombia;
2. in need of strengthening, with scores between 30 % and 50 %: Mexico, Panama, Honduras, Dominican Republic and Venezuela;
3. in need of substantial strengthening, with scores below 30 %: Belize, El Salvador, Guatemala and Nicaragua.

Permanent financing programmes for PAs are being implemented in Costa Rica (Costa Rica Forever)<sup>182</sup> and more recently in Colombia (Herencia Colombia<sup>183</sup>), where they are seeking to develop fund management mechanisms for the long-term financial sustainability of PAs. St Kitts and Nevis has also developed a sustainable financing plan for its PAs system, although it has not yet been implemented.<sup>184</sup> In the case of Costa Rica, the public-private initiative is supervised by a non-profit organisation (Asociación Costa Rica por Siempre). It manages the Forever Costa Rica Irrevocable Trust and the 2<sup>nd</sup> Debt for Nature Exchange between Costa Rica and the USA, which together amount to approximately USD 56 million. The success of this type of programme is based on alliances between governments, international organisations, the private sector and civil society.

<sup>(174)</sup> IUCN – UNEP-WCMC (2016). Op cit.

<sup>(175)</sup> Bovarnick A., J. Fernández-Baca, J. Galindo and H. Negret (2010). Financial Sustainability of Protected Areas in Latin America and the Caribbean: A Guide to Investment Policy, UNDP – TNC.

<sup>(176)</sup> Bezaury Creel J. (2009). Valuation of Environmental Goods and Services Provided by Mexico's Protected Areas. The Nature Conservancy – Programa de México – Comisión Nacional de Áreas Naturales Protegidas, México D.F. 32 pp.

<sup>(177)</sup> Critical Ecosystem Partnership Fund (2001). Ecosystem Profile: Southern Region of the Mesoamerican Biodiversity Hotspot: Nicaragua, Costa Rica, Panama.

<sup>(178)</sup> Fürst E., M.L. Moreno, D. García, E. Zamora, O. Segura, R. García and K. Murillo (2004). Sistematización y análisis del aporte de los Parques Nacionales y Reservas Biológicas al desarrollo económico y social en Costa Rica: los casos del Parque Nacional Chirripó, Parque Nacional Cahuita y Parque Nacional Volcán Poás CINPE INBio.

<sup>(179)</sup> Vere Slinger V. (2002). Ecotourism in a small Caribbean Island: Lessons Learned for Economic Development and Nature Preservation. University of Florida PhD Dissertation.

<sup>(180)</sup> Smith R. (2015). The Caribbean and the post-2015 development agenda. Economic Commission for Latin America and the Caribbean (ECLAC), subregional headquarters for the Caribbean. *Studies and Perspectives* 43.

<sup>(181)</sup> Bovarnick A., J. Fernández-Baca, J. Galindo and H. Negret (2010). Financial Sustainability of Protected Areas in Latin America and the Caribbean: A Guide to Investment Policy, UNDP – TNC.

<sup>(182)</sup> <https://costaricaporsiempre.org/>

<sup>(183)</sup> <https://www.patrimonionatural.org.co/redes-y-plataformas/heco/>

<sup>(184)</sup> Homer F. (2017). A Sustainable Financing Plan for PAs in St Kitts and Nevis. UNDP – Govt of St Kitts and Nevis.



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*View of the Blue Mountains, Jamaica, from a hotel close to the park. National administrations often form partnerships with civil society organisations to improve the effective management and financing of protected areas. The Jamaica Conservation and Development Trust takes part in managing the Blue and John Crow Mountains National Park, as well as raising funds and managing tourism revenues.*

*(© Eric Laudonien/Alamy Stock Photo)*

### Box 3 DEBT-FOR-NATURE SWAP BETWEEN THE USA AND COSTA RICA

The debt-for-nature swap or cancellation mechanism stems from proposals developed by the World Wide Fund for Nature (WWF) in 1984 to promote nature conservation activities in developing countries.

In 2007, as a result of negotiations between the US and Costa Rican Governments and the NGOs TNC and CI, the first debt-for-nature swap<sup>a</sup> was launched in the form of an agreement whereby the US Government wrote off part of the foreign debt to the Costa Rican Government in exchange for a commitment by the latter to invest the same amount in a fund to finance conservation projects in priority geographic areas. In 2010, it was complemented by the second debt-for-nature swap<sup>b</sup>. The US side of the agreement is regulated by the Tropical Forest Conservation Act, first enacted in 1998 and reauthorised in January 2019.

While the first swap emphasised the conservation, protection and connectivity of forests, as well as the development of livelihoods, the second exchange focuses on work within PAs and with the Costa Rican Ministry of Energy and the Environment. The funds are administered by Forever Costa Rica (Asociación Costa Rica por Siempre).

The first swap consisted of USD 26 million, of which about USD 4.2 million was committed up to 2018, and included 52 projects on various themes: support to rural tourism enterprises, creation of forest fire brigades, tree planting, purchase of land for conservation, training of producers in good practices, development of plans for biological corridors, etc. The second swap, to the value of USD 27 million, has so far enabled the updating of the national biodiversity strategy, infrastructure improvements in several national PAs, developing PA management plans, sustainable tourism plans, waste and wastewater management plans, and studies on vulnerability to climate change and land tenure, among others.

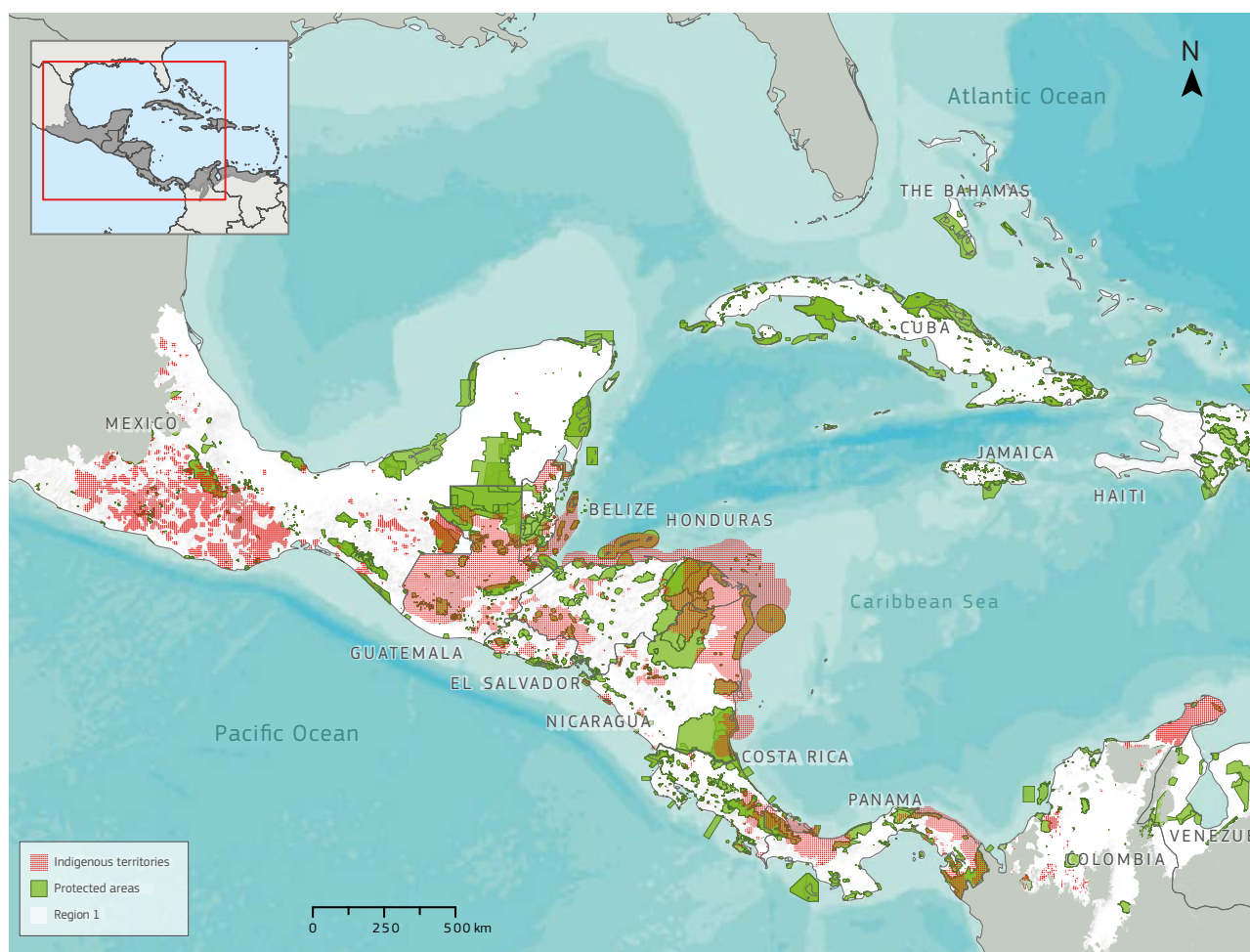
This mechanism has the advantage of not generating a fiscal deficit and allowing for long-term project portfolios.

#### References:

a: <https://primerconjedeuda.org/>

b: <https://canjeporbosques.org/>



**FIGURE 6** Territories managed or co-managed by indigenous peoples

Source: Indigenous territories from Landmark (<http://www.landmarkmap.org/>, consulted August 2020), INCODER (2015) and INEGI-CONABIO (2010); protected areas from IUCN – UNEP-WCMC Protected Planet (2020)

For example, the Herencia Colombia programme is led by the Ministry of Environment and Sustainable Development, National Natural Parks, Patrimonio Natural, the Gordon and Betty Moore Foundation, CI, WCS and WWF, and also has the support of GEF, Corazón de Amazonía and the World Bank, among others.

### 3.2.3 Co-management of PAs with the indigenous population

The relationship between indigenous territories and PAs is very close in this region, and the two frequently overlap. More than 23 different ethnic groups live in the Mesoamerican PA system. PAs are particularly important to contribute to the preservation of the ancestral territories of indigenous populations, although there may also be conflicts between PA managers and indigenous peoples living in or near PAs when adequate mechanisms for dialogue and shared management are not implemented.

Most of the region's PAs that overlap with indigenous territories, were created during the 20<sup>th</sup> century without an adequate consultation process with indigenous peoples. Since the seventh Convention on Biological Diversity (CBD) meeting (COP7, held in 2004), countries are encouraged to promote and recognise the different types of governance in their PA systems, including shared management and the areas conserved by local communities and indigenous territories<sup>185</sup>.

Although there has been good progress to date, the PA systems of some countries still do not officially recognise community management. This is the case in Guatemala, in spite of having approximately 1 300 areas destined for conservation in communal lands and indigenous territories. Likewise, in the Honduran Moskitia, environmental regulations clash with the Miskito people's customary rules for the use and protection of natural resources<sup>186</sup>.

<sup>(185)</sup> <https://www.cbd.int/doc/decisions/cop-07/full/cop-07-dec-es.pdf>

<sup>(186)</sup> Silvel E. (2017). Regional Synthesis: Governance of Indigenous Natural Resources in Mesoamerica. Natural Resources Governance Framework NRGF. MOPAWI – IUCN.



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*Arhuaca farm, Sierra Nevada de Santa Marta, Colombia. The Sierra Nevada de Santa Marta and Tayrona national parks overlap with the territory of the Arhuaco, Kogui, Wiwa and Kankuano peoples, who participate in running the parks. This guarantees that their interests are safeguarded and their ancestral knowledge contributes to improving the parks' management. By cooperating with modern institutions, their traditional way of life is maintained and able to flourish. (Brian Moser/Alamy)*

The mechanisms for shared PA management between native populations and public agencies should ensure a favourable framework for biodiversity conservation, while guaranteeing the continuity of the lifestyles of the indigenous populations involved. There have been both successful and unfortunate experiences in this regard in the region. To date, 5 % of the region's PAs are managed by local communities and 7 % are managed jointly by the government and other entities<sup>187</sup>.

Among the relatively successful cases are the Special Management Regimes (REMs) in Colombia, which have been legally recognised since 1977 (under Decree 622, the basic regulation for the management of the National Natural Parks of Colombia). When there is a territorial overlap between the areas that make up the National Park System and an indigenous reserve (now called indigenous reservations), an REM must be established in favour of the indigenous people. This involves a process of environmental regulation of the territory, regulation of the use and management of natural resources in a joint manner and the effective exercise of coordination of the public function of conservation between the two authorities. The establishment of the REM has resulted in more being achieved than the National Parks environmental authority could have done with its institutional capacity alone, highlighting the advantages of having double protection<sup>188</sup>.

Another successful example is in Panama, with the management of the Corregimiento de Narganá Wildlife Protected Area in the Guna Yala region<sup>189</sup>. Co-management has been practised here since the 1980s, although it has not been formalised. On the initiative of the Guna indigenous people, a general plan was elaborated for the management and development of their region, involving the 49 established communities. The Guna General Congress also approved a Fundamental Law for all types of relations with the Panamanian state, research and academic institutions and others. Although the state has not adopted it as national law, it respects the customary law in its relations with the Guna people, who exercise autonomy and self-determination within their territory. This is an exceptional case in the region.

The experience of the Desierto de los Leones National Park in Mexico shows how establishing a co-management regime is a complex task that can involve a lengthy process of negotiation and conflict resolution. At first, the interaction between government and community actors was complicated by territorial conflicts between the native peoples and their disagreements with government authorities. However, through the structure of an advisory council, in which the communities participate as well as institutions from the three levels of government, academia and civil society organisations, agreements were reached

<sup>(187)</sup> IUCN - UNEP-WCMC (2016). Op cit.

<sup>(188)</sup> <http://www.parquesnacionales.gov.co/portal/es/sistema-de-parques-nacionales-naturales/linea-tematica-de-manejo-regimenes-espaciales-de-manejo/> with contributions from Sandra Sguerra

<sup>(189)</sup> Masardule O. (2012). Reconocimiento y Apoyo a Las ICCAs en Panamá. In: Kothari, A. with C. Corrigan, H. Jonas, A. Neumann and H. Shrumm (Eds.). Recognising and Supporting Territories and Areas Conserved By Indigenous Peoples And Local Communities: Global Overview and National Case Studies. Secretariat of the Convention on Biological Diversity, ICCA Consortium, Kalpavriksh, and Natural Justice, Montreal, Canada. Technical Series No. 64.





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*Private conservation initiatives cover considerable areas in some countries. In this region, more than 10 % of protected areas are owned privately or by non-profit organisations. One pioneer of its type was the Monteverde Cloud Forest Biological Reserve in Costa Rica, created in 1972 and managed by the Tropical Science Center, an NGO. Its elevated walkways enable 70 000 visitors a year to appreciate the spectacular cloud forest vegetation at canopy level. (Simon Dannhauer/Alamy)*

despite their differences, which helped to define common work routes and coordinate environmental monitoring and restoration actions.

### 3.2.4 Private protected areas

Of the PAs in the region, 8 % are managed by private owners and 5 % by NGOs or other non-profit organisations.<sup>190</sup>

In some countries, they represent a significant proportion of the total protected area. This is the case in Belize, where in 2010 there were 8 private PAs covering 131 663 hectares, representing 13 % of the country's protected area. There are also a large number of private PAs in Guatemala (129) and Nicaragua (50), covering a smaller area (53 135 and 7 748 hectares respectively)<sup>191</sup>.

Apart from formally declared private reserves, there are a large number of informal reserves. Some are acquired and managed by NGOs, while others derive from the implementation of payment for environmental services or economic incentives in exchange for a commitment to conserve the forest. Costa Rica was the pioneer in the region in the use of conservation easements (or covenants), beginning in 1992. Later, countries such

as Mexico, Honduras and Guatemala joined this initiative<sup>192</sup>.

It should be noted that the number of private PAs has been growing rapidly in the Central American subregion since the 1980s, promoted by the Central American Regional Policy for Private Conservation, under the framework of CCAD (Central American Commission on Environment and Development).

Likewise, private PAs are becoming more organised. The Costa Rican Network of Private Natural Reserves<sup>193</sup> (with 210 reserves, totalling 82 045 hectares) was founded in 1995. Its success triggered the creation of other similar networks in Central America in Panama, Guatemala, Honduras, El Salvador, Belize and Nicaragua. They form the Mesoamerican Private Conservation Network (based in El Salvador). On a larger scale, the Latin American Alliance of Private Reserves, based in Guatemala, also includes PAs in Colombia and Mexico, but not Venezuela as it does not yet have a national network.

<sup>(190)</sup> IUCN – UNEP-WCMC (2016). Op cit.

<sup>(191)</sup> Bovarnick, A., J. Fernández-Baca, J. Galindo and H. Negret (2010). Financial Sustainability of Protected Areas in Latin America and the Caribbean: A Guide to Investment Policy, UNDP – TNC.

<sup>(192)</sup> Ristino L.A. and J.E. Jay (2016). A Changing Landscape: The Conservation Easement Reader. ELI Press/Environmental Law Institute. Washington, USA. 544 pp.

<sup>(193)</sup> <https://www.reservasnaturales.org/>







# #4

## Lessons learned and promising approaches



*Epiphytes growing on a tropical rainforest tree in  
Trinidad and Tobago. Epiphytes are plants that grow on  
a host but unlike a parasite take no nutrients from it.  
They include ferns, mosses, lichen and orchids.  
(Altin Osmanaj/Alamy)*



*The oldest human settlements in Costa Rica can be found in the basin of the Reventazón river and its tributaries, in the Orosi Valley. Today the basin supports considerable socio-economic activity, including farming, industry, urban development, hydroelectricity and ecotourism, all legally regulated by the Reventazón Basin Planning and Management Plan.*  
(Elizabeth Bennett/Alamy)

## #4 \_ Lessons learned and promising approaches

### 4.1 PLANNING AND MANAGEMENT ON A LANDSCAPE SCALE

Conservation through PAs, necessarily limited to certain territories of high environmental value, is not sufficient to adequately address the direct threats or drivers of threats to biodiversity at a landscape scale. A large portion of land outside PAs is subject to significant anthropogenic pressures and conversion processes. Conservation strategies should therefore go beyond sectoral<sup>194</sup> or site conservation approaches (without, however, neglecting these). An integrated approach should be adopted to reconcile conservation, restoration and production processes at a landscape<sup>195</sup> scale.

A landscape approach can be defined as a framework for integrating policies and practices for multiple competitive uses of the territory, through the implementation of adaptive and integrated management systems<sup>196</sup>. It is an iterative, flexible and continuous process of negotiation, decision-making and re-evaluation, based on scientific information but shaped by human values and aspirations. The landscape is defined in broad conceptual terms and not simply as a physical space<sup>197</sup>.

There are many examples of the application of landscape approaches in the region, such as biosphere reserves, biological corridors on a subregional scale or focused on umbrella species,

model forests, etc. These initiatives are often integrated, which is precisely what makes for connectivity. For example, the Sian Ka'an-Calakmul (Mexico) biological corridor connects two biosphere reserves, allows the passage of several umbrella species, such as the jaguar (*Panthera onca*) and Baird's tapir (*Tapirus bairdii*), and is integrated into the Mesoamerican Biological Corridor.

Regional biological corridors involve the additional challenge of achieving good cross-border coordination. One recent, ambitious initiative is the 5 Great Forests of Mesoamerica alliance, promoted by 8 Central American governments (see Box 4).

Intersectoral and interinstitutional coordination is a critical success factor in this type of initiative. To address the pressures affecting biodiversity, the countries of the region are progressively adjusting their environmental policies and legislation towards a landscape approach. For example, they are incorporating the need for planning processes at the local level to integrate agriculture with other productive and conservation activities. In this framework, public sector interventions require an intersectoral approach with good coordination between the different levels and agencies of the state<sup>198</sup>. The development of synergies with NGOs and academic institutions, as well as the active participation of local communities and the private sector, is a key factor<sup>199</sup>.

<sup>(194)</sup> UNEP (2012). Global Environment Outlook-5: Environment for the future we want. United Nations Environment Programme.

<sup>(195)</sup> SICA – CCAD (2014). Regional Environmental Strategy Framework 2015-2020. Central American Integration System (SICA) – Central American Commission on Environment and Development (CCAD).

<sup>(196)</sup> Reed J., J. Van Vianen, E.L. Deakin, J. Barlow and T. Sunderland (2016). Integrated landscape approaches to managing social and environmental issues in the tropics: learning from the past to guide the future. *Global Change Biology* 22, pp. 2540-2554.

<sup>(197)</sup> Sayer J., T. Sunderland, J. Ghazoul, J.-L. Pfund, D. Sheil, E. Meijaard, M. Venter, A.K. Boedihartono, M. Day, C. Garcia, C. van Oosten, and L.E. Buck (2013). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences of the United States of America* 110, pp. 8349-8356.

<sup>(198)</sup> Diaz S. (2010). Biodiversity and Human Well-being in Latin America and the Caribbean: A Multi-Sectoral Contribution to the Science-Policy Interface. Policy Brief. International Council for Science (ICSU)-ROLAC.

<sup>(199)</sup> UNEP (2012). Op cit.





#### Box 4. THE MESOAMERICAN BIOLOGICAL CORRIDOR AND THE 5 GREAT FORESTS ALLIANCE<sup>a</sup>

In the 1990s, with the region's biodiversity coming under increasing pressure, countries in the Central American Integration System (SICA) promoted the Mesoamerican Biological Corridor (MBC), a network of large intact ecosystems connected by corridors in which land use is managed to enable the movement of wild animals and the provision of ecosystem services, without interfering with human development.

Today, five large areas of remaining rainforest form the backbone of the corridor: the Maya Forest; the Moskitia; the Indio Maíz-Tortuguero; the Talamanca region and the Darién. However, the forests face problems typical of the region and are being destroyed at an alarming rate, despite efforts to protect them. In the last 15 years, three have shrunk by almost a quarter of their size as a result of agricultural expansion. The main threat now is illegal cattle ranching, which has led to more than 90 % of recent deforestation. The gradual degradation of these areas particularly affects the traditional livelihoods of several indigenous peoples, whose territory covers half of their area.

In an effort to re-energise the MBC, the '5 Great Forests of Mesoamerica' alliance was created, bringing together governments, indigenous peoples and local communities, universities and local and international civil society organisations. Eight Central American countries presented the alliance at the UN Climate Change Conference in 2019 (COP 25) as an integral part of their regional climate action plan. The initiative aims to bring together the agricultural and environmental sectors to restore and conserve 10 million hectares of degraded forests and lands by 2030 and achieve carbon neutrality in the agriculture and forestry sector by 2040. The protection of the 5 areas constitutes a nature-based solution to the climate crisis.

To achieve its objectives, the alliance has a strategic plan with 5 priorities: promote sustainable alternative production systems to livestock farming; strengthen protected areas and indigenous territories; restore degraded ecosystems; harmonise national policies and strengthen forest governance; and fight against illegal livestock farming and trafficking. The plan is supported by EU funding.<sup>b</sup>

*a:* <https://www.wcs.org/5-great-forests>; <https://www.dw.com/es/mesoamérica-unida-contra-la-deforestación-de-sus-cinco-bosques-más-grandes/a-52863877>; [https://www.sica.int/noticias/alianza-cinco-grandes-bosques-de-mesoamerica-iniciativa-ambiental-centroamericana-lanzada-en-la-cop25\\_1\\_120718.html](https://www.sica.int/noticias/alianza-cinco-grandes-bosques-de-mesoamerica-iniciativa-ambiental-centroamericana-lanzada-en-la-cop25_1_120718.html)

*b:* Action document



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*A Chorti villager collects coffee beans in the buffer zone of Trifinio biosphere reserve, Guatemala. A landscape approach in the reserve's periphery enables sustainable production such as agroforestry coffee plantations, sustainable forest management and agritourism developed by local communities. (© J.L.Urrea/CCAFS)*

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*Jaguar, Belize. The jaguar is one of Central America's emblematic umbrella species. To maintain viable populations, these species must have access to large natural areas connected to each other. Applying a landscape approach and consolidating connectivity corridors at different scales contribute to preserving these areas. (© All Canada Photos/Alamy)*

## 4.2 INTEGRATION OF PAS INTO A LANDSCAPE

PAs are one of the pillars for biodiversity conservation, providing ecosystem services and maintaining human welfare. PA management as part of a landscape and culture, and based on compatible uses, reinforces their impact. To improve the social acceptance of PAs and get them fully integrated into the landscape, several strategies have proven to be useful<sup>200</sup>:

- 1 Raise awareness among civil society and the authorities about the role of PAs, not only for conservation but also for the provision of key ecosystem services beyond their borders (see section 4.5).
- 2 Recognise the importance and promote the plurality of conservation areas (see OECM in section 5.2.1). Both indigenous territories and private PAs have proven to be efficient mechanisms to complement public sector efforts for the effective conservation of priority sites and species.
- 3 Promote connectivity, through links between PA systems in both a horizontal sense (between different countries' systems and with cross-border initiatives) and a vertical sense (between systems of national and sub-national governments, as well as with private PAs). Several initiatives in the region are moving in this direction, such as the Central American System of Protected Areas. The organisation of PAs into networks (e.g. national and regional networks of private PAs in Central America) or within mixed initiatives (e.g. biological corridors) reinforces their potential for achieving joint conservation objectives and increasing management efficiency.
- 4 Consolidate PA governance systems that ensure the full and effective participation of all stakeholders, especially indigenous and local communities (see section 4.3), and the equitable sharing of costs and benefits of PAs. These must provide a framework to enhance the economic opportunities associated with the management of PAs and their buffer zones by communities (e.g. nature tourism, sustainable production, etc.). Within this framework, it is important to place greater emphasis on the conservation of 'nature' (and not only 'biodiversity'), understood in a broad sense, which includes its cultural and spiritual role.
- 5 Promote the participation of PA managers in the formulation, implementation and evaluation of public policies for land management and development in the countries, at the different governmental levels. This favours the continuity and growth of protected areas, as opposed to the pressures that other land-use projects may exert on them.

<sup>(200)</sup> Dudley N., C. Groves, K.H. Redford and S. Stolton (2014). Where now for protected areas? Setting the stage for the 2014 World Parks Congress. *Oryx* 48(4), pp. 469-503.





#### Box 5. TRIFINIO FRATERNITY BIOSPHERE RESERVE, A LANDSCAPE FOR TRI-NATIONAL CONSERVATION

Biosphere reserves are areas composed of terrestrial, marine and coastal ecosystems, recognised by UNESCO's Man and the Biosphere Programme. Each promotes solutions to reconcile biodiversity conservation with sustainable use, economic development, research and education. They encompass broad landscapes that include protected areas (core), buffer zones and transition zones where sustainable resource-use activities are carried out.

The Trifinio Fraternity Biosphere Reserve was designated in 2011. With an area of 7 541 km<sup>2</sup>, it is the first tri-national reserve in the Americas (45 % in Guatemala, 15 % in El Salvador and 40 % in Honduras). It consists of 12 municipalities with a population of approximately 200 000 people.

It includes key biodiversity areas such as Montecristo National Park (El Salvador), La Fraternidad Biosphere Reserve (Guatemala) and Montecristo National Park (Honduras), as well as remnants of different ecosystems ranging from dry forest to coniferous mountain forest. It represents an important water catchment area and its PAs generate about 2 160 million m<sup>3</sup> of water per year. This water supply is one of the most important ecosystem services provided to communities.

In the buffer and transition zones, sustainable productive activities such as agroforestry coffee plantations, sustainable management of coniferous forests and agritourism have been developed.

The declaration of the area as a biosphere reserve provided the three countries with a framework for cooperation to carry out a common management plan. Strong support from government (deputy ministers of the three countries) and the active involvement of the local communities have been important factors in its success. The Trifinio Fraternity Biosphere Reserve is considered an example of tri-national cooperation for management at the landscape level, leading to better conservation.



< *Miskito children, Rio Platano Biosphere Reserve, Honduras. The biosphere reserves of Rio Platano and Bosawas (Nicaragua) in the Mosquitia cover 80 000 km<sup>2</sup>. They are part of the '5 Great Forests of Mesoamerica', where indigenous groups are involved in the planning and management of many of the large intact forest blocks. (blickrwinkell/ Alamy Stock Photo)*

#### 4.3 CONSERVATION AND SUSTAINABLE USE BY COMMUNITIES

In the region, the relationship between PAs and rural communities is very close (cf. section 3.2.3). For rural populations, conservation actions, particularly the implementation or consolidation of PAs, may have a very positive effect and enhance stability at a local level when the PA contributes to preserve livelihoods (dependent on ecosystem services) and allows them to use natural resources in a sustainable manner. On the contrary, the application of a more rigid concept, which excludes populations from protected areas and/or drastically limits their access to natural resources, affects local people's interests and is a permanent source of conflict.

The experiences developed in the region have shown that, in addition to applying the principles of free, prior and informed consent, greater involvement of local communities in the management of protected areas (e.g. co-management schemes such as the special management regimes in Colombia) is not only timely from an ethical and human rights point of view, but also represents a contribution to ensuring effective conservation.

The indigenous and conserved community area (ICCA) consortium<sup>201</sup>, made up of more than 150 indigenous organisations and NGOs, has members in most of the region's countries. During its first regional assembly in Fusagasugá (Colombia) in November 2018, it proposed lines of action<sup>202</sup> to recognise and enhance the contribution of indigenous peoples to biodiversity conservation. They include promoting the recognition of ICCAs, consolidating property rights and government autonomy, and strengthening the capacities of indigenous organisations.

Many peasant and indigenous communities in the region have gone through, or are still going through, years of living together and fighting together for their rights to access resources. As a result, they have often developed a shared vision of these resources, as well as relationships of trust and reciprocity, which are at the core of the cultural identity of the inhabitants of a given landscape. This cultural belonging to a landscape, added to the related traditional knowledge, can facilitate consensus on management rules that tend towards sustainability, which is why it is considered an important element in social capital for conservation. These factors are neither exclusive to indigenous communities nor extensive to all communities, but many have a world view and consequently systems of governance that more explicitly recognise the interdependence of human society and natural resources.

In this way, the participation of traditional rural communities is also key to maintaining and developing sustainable production practices, outside of strict conservation areas. The application of their traditional practices (or practices inspired by them) can contribute to reduce the rate of deforestation, advance towards the sustainable management of resources and generate a series of environmental and social co-benefits. Central American countries have a long history of community management. In Honduras alone, there are more than 230 agroforestry cooperatives, comprising more than 9 000 people. In the case of Mexico, the evolution of institutional efforts to include the environmental dimension in public policies and in the work of institutions with rural inhabitants is noteworthy<sup>203</sup>.

<sup>(201)</sup> <https://www.iccaconsortium.org/index.php/es/descubra/>

<sup>(202)</sup> <https://www.iccaconsortium.org/wp-content/uploads/2018/11/Declaracio%CC%81n-Encuentro-Regional-Fusagasug%C3%A1-FINAL.pdf>

<sup>(203)</sup> CLAC – FAO – IICA (2015). The Outlook for Agriculture and Rural Development in the Americas: A Perspective on Latin America and the Caribbean 2015-2016. ECLAC, FAO, IICA, San José, Costa Rica. 214 pp.



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*Mangroves of Puerto Barillas  
 in Jiquilisco Bay, El Salvador.*

*In this Ramsar site, the  
 over-exploitation of mangrove  
 resources has been reduced  
 through the participative  
 implementation of local  
 sustainable use plans.  
 (Sergi Reboredo/Alamy)*



#### Box 6. LOCAL SUSTAINABLE USE PLANS IN EL SALVADOR'S MANGROVES<sup>a</sup>

The local sustainable use plans (PLAS), developed in El Salvador, aim at the sustainable management of resources. They are a tool for participatory local governance, established between communities, academic institutions, NGOs, the Ministry of Environment and natural resources (MARN) and other state institutions (e.g. local governments, environmental division of the police, etc.). All are part of PLAS monitoring committees that have benefited from the technical and financial support of trusts, such as the Initiative for the Americas Fund El Salvador (FIAES).

The first PLAS was initiated through a consultation process promoted by the Mangrove Association and developed with 8 communities. It was approved by MARN in 2011 as a way to regulate the ways in which flora and fauna species are extracted and to ensure the sustainability of resource use from mangroves. Subsequently, other PLAS were established, including the Bahía de Jiquilisco and Estero de Jaltepeque Ramsar sites, as well as the Xirihualtique-Jiquilisco Biosphere Reserve. Together, they now cover approximately 9 000 hectares of mangroves, and the organisations that support the initiative plan to reach 31 000 hectares by 2031.

The key to the success of PLAS is that they are based on local needs and capacities, while enhancing the science-policy-community interface. Management rules are established based on both the carrying capacity and resilience of wildlife communities and the needs of the families using the resources. The communities are the ones who organise themselves for the control and protection of the mangroves: they carry out monitoring, evaluation and environmental awareness activities. In this way, over-exploitation of mangrove resources has been reduced.

On the other hand, mangroves managed with a PLAS have been prioritised to promote restoration processes, as part of MARN's ecosystem and landscape restoration programme. It is hoped that this synergy will help restore the area's original hydrodynamics.

#### References:

<sup>a</sup> Communities Building a Culture of Participation for the Protection and Restoration of the Mangrove Ecosystem, m, IV National Mangrove Forum: Jiquilisco Xirihualtique Biosphere Reserve and Jiquilisco Ramsar Site (8 November 2017)

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*Abel Martínez, a UZACHI (Union of Zapotec-Chinantec Forest Producing Communities of the Sierra Juárez) forestry technician, working in the forests of the Sierra Juárez, Mexico. Community forestry is an opportunity to promote both the sustainable management of forests and the empowerment of indigenous communities. (Keith Dannemiller/Alamy)*



#### Box 7. COMMUNITY FORESTRY IN SIERRA JUAREZ, MEXICO<sup>a</sup>

The community forestry experience in the communities of the Sierra Juárez, in the north of Oaxaca state (Mexico), is considered to be very successful. The Union of Zapoteco-Chinanteca Communities (UZACHI) is particularly noteworthy.

The UZACHI is made up of 4 communities of the Zapotec and Chinantec ethnic groups, and together they have an area of 231 km<sup>2</sup> of forest in their territory. The groups have a long experience of cooperation, having fought together to obtain the recognition of their rights over their territory and resources since the 1980s. At that time, their forests were under concession to a state-owned paper manufacturing company. Taking advantage of a decline in the company's activity and the approval of the Forest Law of 1985 (which favours autonomous forest management by agrarian nuclei), the communities set up a union. They reclaimed not only the facilities left by the company, but also used their own knowledge about the productive processes to organise more diversified community enterprises, with activities including logging, transport, sawmills and in some cases drying and carpentry.

Forest management plans were designed in line with existing traditional practices, with the aim of improving the decimated environment left by the company. In addition, through land-use planning, a variety of areas were defined to respond both to community needs for family use and subsistence, and to conservation needs: areas of subsistence crops and pastures, areas of timber and non-timber production (firewood, edible mushrooms, building materials), ecotourism areas, water catchment areas and areas for the protection of wildlife.

Through UZACHI, each community has been able to access technical assistance and research services, as well as international cooperation resources. They have received certification of good forest management and now have their own forest technical service. The small forestry community of Santiago Xiacui, with 1 767 ha of forest, produces 2 000 m<sup>3</sup> of timber, generating around MXN 1.2 million (approximately USD 92 400 in 2012) annually, which it reinvests in both the company and social services for the community.

The organisation is based on the general assemblies of each community, where the basic decisions regarding forest management and production are made. Strong forms of governance within the communities, a strong sense of belonging to the landscape, and the existence of democratic processes that are inclusive of decision-making have been determining factors in the success of the recovery and conservation process in Sierra Juárez. Other fundamental factors have been the development of their own technical forestry services, the efficient and transparent administration of common resources, marketing and the formation of alliances for applied research, training and technical assistance.

#### References:

a: UN – REDD (2012). *Indigenous land tenure and REDD+ as an incentive for forest management: the case of Mesoamerican countries*



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*Nargana protected wildlife area, Guna, Panama. The Guna general congress, the political authority of the Guna Yala indigenous province in Panama, created the protected area in 1987 and manages it with the support of Panama's environment ministry. It covers almost a third of the province's territory. (Oyvind Martinsen/ Alamy Stock Photo)*

## 4.4 GOOD GOVERNANCE

In the absence of recognised governance mechanisms that allow local populations to maintain some control over the use of the territory, projects that only serve interests outside these territories can occur, generating socio-environmental impacts and conflicts (e.g. hydrocarbon exploitation, construction of hydroelectric dams, etc.). Also, organised groups often take advantage of the deficiencies of local governance to develop highly profitable illegal activities (illegal mining, wildlife trafficking, etc.). This situation is particularly prevalent in the region's large blocks of well-conserved ecosystems, where government presence and control are often low and accessibility by land is limited. It has serious consequences for the security of park guards, community leaders and other defenders of nature. Colombia, Mexico, Honduras, Nicaragua and Guatemala are among the countries most affected by this type of violence in the world (see section 2.4.2).

Poor environmental governability also favours a dynamic of unregulated colonisation in certain areas, synonymous with environmental degradation, insecurity and poverty. In general, it hinders the implementation of policies and rules, and impedes the achievement of both biodiversity conservation and local socio-economic development objectives. This situation is more critical when resources are limited, by population density and degraded ecosystems for example, as in the case of Haiti.

To address these phenomena and ensure the long-term sustainability of conservation processes, strong governance mechanisms need to be established. This requires a strengthening of social forms of civil society organisation and local control, participatory land-use planning, building conservation agreements and, where necessary, formalising land tenure. The task is complex and long-term, demanding an integrated perspective.

Among the main success factors<sup>204</sup> are the adequate availability of financial, logistical and human resources, access to relevant information, training and awareness of the actors involved in environmental problems. Fundamentally, decisions and accountability mechanisms must become more transparent, to ensure a fairer and more equitable distribution of the benefits derived from the uses and conservation of the territory, to improve the provision of public services, to establish participatory and inclusive procedures for all stakeholders for the implementation of actions, and to ensure adequate levels of interinstitutional and inter-sectoral coordination.

Consideration should also be given to the fundamental roles played by women in the management and conservation of biodiversity. Their empowerment and effective participation in decision-making processes are indispensable to consolidate good environmental governance.

A number of initiatives in the region are known for their success in consolidating governance at the landscape scale, such as the multisectoral table for the Maya Biosphere Reserve (Guatemala). Likewise, the growing empowerment of civil society in environmental management can be observed in Costa Rica, where civil society has influenced the government to establish public policies that prohibit the exploitation of hydrocarbons in the national territory. Another example of a promising approach is in Colombia's Chocó, where the court recognised the Atrato river as a subject of rights, with a view to guaranteeing its conservation and protection, and setting up a commission of guardians (partly composed of representatives of local communities) to speak on its behalf<sup>205</sup>.

<sup>(204)</sup> UNEP (2012). Op cit.

<sup>(205)</sup> <https://www.minambiente.gov.co/index.php/component/content/article/3573-sentencia-t-622-de-2016-rio-atrato-como-sujeto-de-derechos>



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*Tapir (Tapirus bairdii) in Belize. Tapirs are an important link in the ecological cycles of forests. They are known as architects of the forest, as they are important seed dispersers. (© Papilio/Alamy)*



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*The ancient city of Tikal in the Maya Biosphere Reserve, Guatemala, is governed by a multi-stakeholder roundtable of public, private, community and other bodies. Among its achievements, it agreed a shared environmental security strategy to address issues such as wildlife poaching, drug and human trafficking, looting of archaeological sites and land-use change. (Leonid Andronov/Alamy Stock Photo)*

#### **Box 8. MULTI-SECTORAL COMMITTEE IN MIRADOR RÍO AZUL NATIONAL PARK (MAYA BIOSPHERE RESERVE, GUATEMALA)<sup>a, b</sup>**

A multi-sectoral committee was created in response to a controversy generated when the Government of Guatemala modified the area's territorial planning. It had the following objectives: 1) to become a space for dialogue, analysis and discussion in order to find a common agenda for the conservation and development of Mirador-Río Azul National Park, Biotope Dos Lagunas and the multiple-use zone of the Maya Biosphere Reserve, based on strategic alliances; 2) to contribute to the development of integrated multisector plans focused on organising activities and consolidating the management of the areas; 3) to promote projects focused on generating economic benefits, with the participation of local populations. It also aimed to strengthen the binational agreements with Mexico and Belize, which could counteract phenomena such as human trafficking, trafficking in flora and fauna, looting of archaeological sites, drug trafficking and changes in land use.

Government, community, academic, private and NGO-sector bodies participate and are represented on the executive committee. There are monthly plenary meetings (to deal with issues such as security, governance, infrastructure development, community conflicts, etc.), and committees dedicated to specific issues. Procedures for participation and decision-making have been clearly established, seeking to make them as inclusive and transparent as possible.

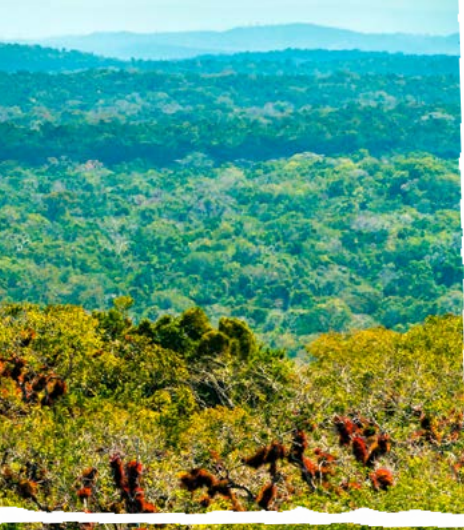
Results of this participatory process include the strengthening of strategic alliances between different sectors of society, agreement on a shared environmental security strategy, which allowed for a more efficient investment of resources, and promoting tourism development with the construction of infrastructure and training for local people.

As a lesson learned, it is emphasised that boosting the capacities of community groups is key to ensuring the successful implementation of activities resulting from the agreements. Likewise, it is important to support public and political advocacy exercises, to institutionalise the agreements and ensure their compliance.

#### *References:*

- a: Radachowsky J. (2013). Multi-stakeholder platforms for conservation and development in complex social-ecological systems. University of Florida*  
*b: BALAM Association (2007). Report on results and progress in the process. Mesa multisectorial zona natural y cultural Mirador-Río Azul. .*





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*Cloud forest at Morne La Croix in Trinidad's Northern Range. The remaining rain and cloud forests, especially in the Caribbean islands, protect vital water sources for growing human populations. Payment for environmental services schemes that focus on water supply could finance the preservation of these forests. (FLPA/Alamy)*

## 4.5 VALUATION OF ECOSYSTEM SERVICES

The ecosystem approach, adopted by the CBD, is a type of landscape approach. One of its most promising applications for the region is to consider, in land-use planning processes, the value of environmental services provided by ecosystems and the external costs of biodiversity loss. Incorporating the concept of ecosystem goods and services allows the benefits of conservation to be presented in a language that policymakers can understand and use. As an example, the contribution of the Costa Rican PA system to its GDP was USD 814 million by 2005<sup>206</sup>. Likewise, in 2014 the Economics of Ecosystems and Biodiversity for the Netherlands (TEEB-NL) programme estimated the economic value of the marine and terrestrial ecosystems of the Caribbean Netherlands at USD 122 million per year, or about USD 5 800 for each of the islands' residents<sup>207</sup>. Such valuations provide a justification for avoiding undertaking works or activities that do not generate profits in the medium and long term, as they undermine the functionality of ecosystems. At the same time, they encourage the implementation of management mechanisms (protection, monitoring, control and surveillance, economic incentives) that contribute to the protection and/or sustainable management of

ecosystems and their biodiversity, in order to maintain their capacity to provide services.

Within this framework, payment for ecosystem services (PES) systems have become an important mechanism for mobilising funds for conservation. Countries such as Costa Rica, Mexico and Colombia lead the region in this regard, as they have large-scale programmes in place.

Water is a unifying theme; in fact, payment for hydrological services is the most common type of PES. Several water funds have been set up in the region (mainly in Colombia, Costa Rica, Mexico and the Dominican Republic), for which the Latin American Alliance of Water Funds has been instrumental<sup>208</sup>. Likewise, two of the largest and longest established national programmes of mechanisms of payment for hydrological services are in Costa Rica and Mexico.<sup>209</sup>

The Payment for Environmental Services Programme (PPSA) in Costa Rica offers a good example of how to ensure the financial sustainability of this type of mechanism, through a clear legislative vision: the government, using the tax simplification law, created the single tax on fuels, of which 3.5 % is destined for the PPSA<sup>210</sup>. As for Mexico's Hydrological Environmental Services

<sup>(206)</sup> Fürst E., M.L. Moreno, D. García and E. Zamora (2005). Systematization and analysis of the contribution of National Parks and Biological Reserves to the economic and social development in Costa Rica: the cases of Chirripó National Park, Cahuita National Park and Poás Volcano National Park. IMBio. CINPE. San José, Costa Rica. 219 pp.

<sup>(207)</sup> <http://sdg.iisd.org/news/ecosystem-services-of-caribbean-netherlands-valued-at-122-million-per-year/>

<sup>(208)</sup> <http://fundosdeagua.org/es>

<sup>(209)</sup> Blackman A., R. Epachin-Niell, J. Siikamäki and D. Velez-López (2012). Prioritizing policies for biodiversity conservation in Latin America and the Caribbean: A rapid assessment. 157 pp.

<sup>(210)</sup> <https://www.fonafifo.go.cr/en/servicios/pago-de-servicios-ambientales/>



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*Bicknell's thrush (Catharus bicknelli), Dominican Republic. This migratory bird nests in North America and overwinters in the Greater Antilles, where it is threatened by the transformation of its habitat and is classified as vulnerable. In the Dominican Republic, an ingenious payment for the environmental services scheme helps fund the El Zorzal private reserve with contributions from the cocoa and chocolate sector, thus protecting part of the habitat of this migratory species. (Evan Curtis/iStock)*

Programme (HESP), it is financed through federal taxes on water use. The HESP also has a positive social dimension, since it is implemented as a priority in areas with the highest levels of poverty.

REDD+ projects in the region are in Colombia and Mexico, among others. Both countries are also promoting the creation of domestic carbon markets. These include the BanCO<sub>2</sub> system<sup>211</sup> and the Voluntary Mitigation Mechanism for greenhouse gas emissions<sup>212</sup> in Colombia, and MEXICO<sub>2</sub>, the first environmental market platform in Mexico<sup>213</sup>.

The private sector is an important partner in many PES systems. This is the case, for example, of the Thrush Fund in the Dominican Republic (within the framework of the Plan Vivo)<sup>214</sup>, on which one of the first PES systems created in the Caribbean is based. Chocolate companies pay an additional USD 450 for each tonne of organic cocoa purchased from producers located in the buffer zone of the El Zorzal Private Reserve. This money goes into the Zorzal Fund, which allows producers to be financially rewarded for the area of forest they conserve.

The main success factors for PES systems are:

1. the benefits of ecosystem services are clearly identified and valued;
2. stakeholders (authorities, productive sector, communities, civil society) are properly informed and trained;
3. transparency and equitable access for all actors to the corresponding benefits;
4. clear, simple and practical payment mechanisms;
5. integration into a comprehensive and reliable legal, institutional and policy framework;
6. financing through permanent funds;
7. diversity of demanders and buyers of services.

Prior to or in conjunction with the implementation of such systems, it is important to ensure that the property rights of the populations settled in the areas providing the services are secure.

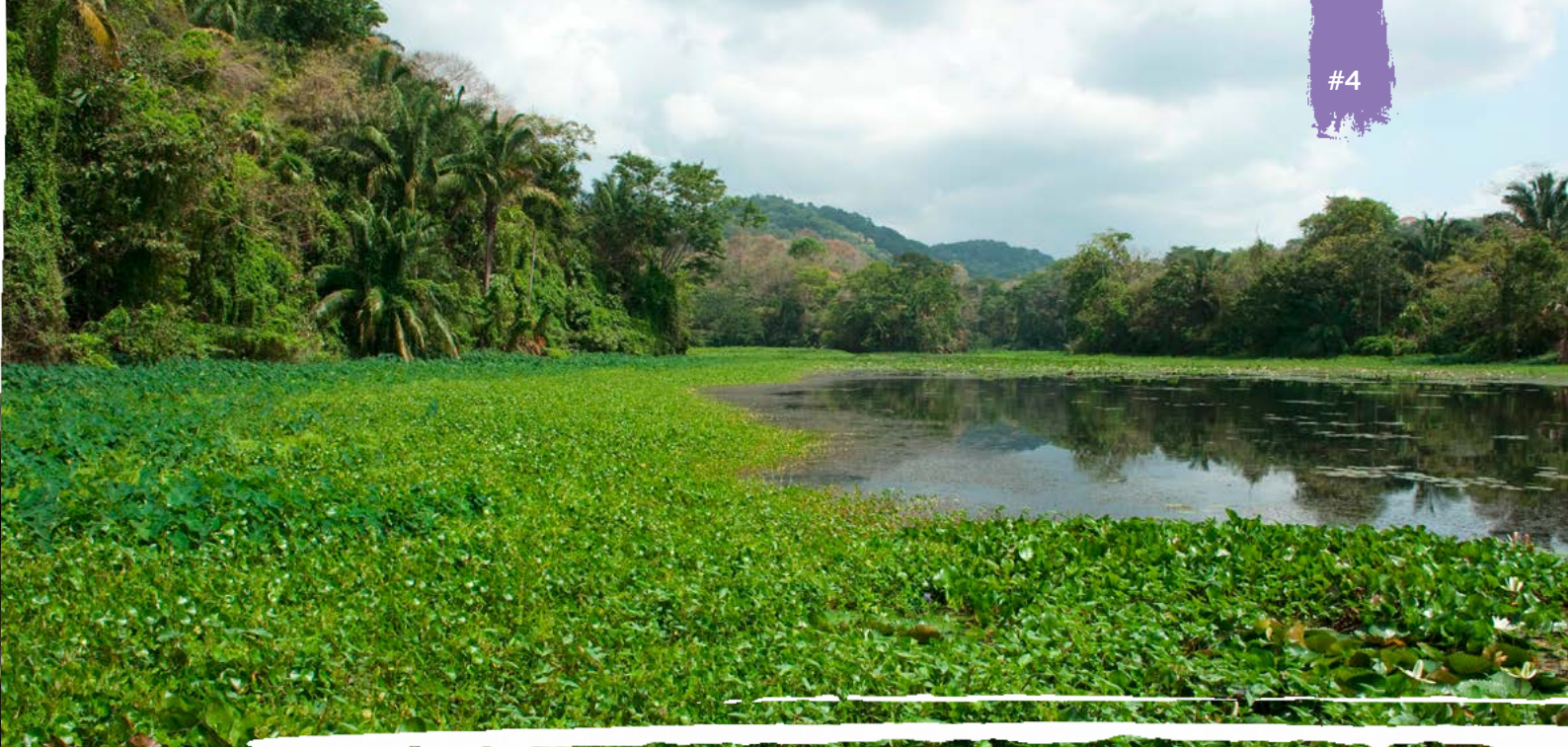
<sup>(211)</sup> <http://www.banco2.com>

<sup>(212)</sup> Fundación Natura. MVC Colombia: Experiencia y lecciones aprendidas a partir del diseño, ejecución y seguimiento de un proyecto GEF / Gómez Charry, Roberto León. Bogotá 2017. Available at <http://www.natura.org.co/wp-content/uploads/2018/09/Experiencia-Lecciones-aprendidas-ejecucion-proyecto-GEF.pdf>

<sup>(213)</sup> <http://www.mexico2.com.mx/index.php>

<sup>(214)</sup> <https://biodiversidad-rd.net/reserva-privada-el-zorzal/>





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*The Chagres river is of crucial strategic importance for Panama's economy and the quality of life of 2 million Panamanians. With its two artificial lakes (Gatun, above, and Alajuela), it provides 40 % of the water needed to operate the Panama Canal, and 80 % of the water required to meet national demand. Chagres National Park and Sovereignty National Park, created to protect the basin and the eastern bank of the Canal, are home to a remarkable biodiversity. (Papilio/Alamy Stock Photo)*

#### Box 9. VALUATION AND ACCESS TO WATER IN PANAMA AND EL SALVADOR<sup>a</sup>

Barú Volcano National Park, Panama, is a PA that ensures the provision of water for human consumption and agricultural, industrial and energy development for more than 19 000 inhabitants. The benefits of the water resource provided by the PA have been valued at USD 522 million per year. This estimate includes the generation of hydroelectric energy, which represents 95 % of the water demand of the PA. Negotiations were facilitated that resulted in the creation of a Conservation Fund for Barú Volcano National Park. Participants in the fund, a public-private initiative, include government representatives, NGOs, local communities, unions and private initiatives.

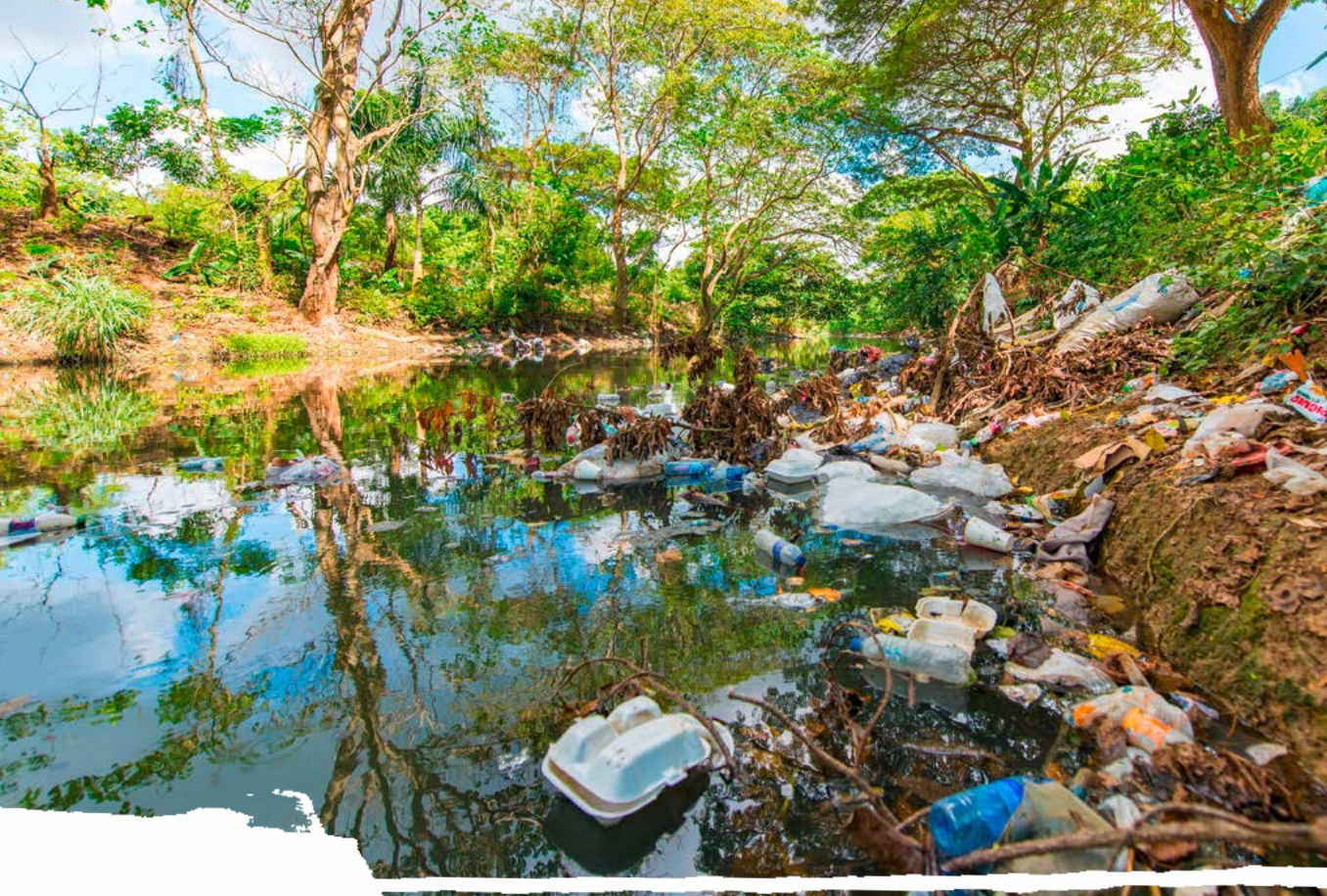
La Montaña PA, in El Salvador, is located in a region with one of the highest poverty levels in the country. Its forests protect watersheds on which agricultural development, water supply and the provision of firewood and wood for more than 35 000 inhabitants depend. One study estimated the value of the water supply for the communities at between USD 2.3 million and USD 7 million per year. On this basis, municipal laws were developed for: 1) the protection of forest resources, and 2) the creation and implementation of a municipal fund for the management of natural resources. Both instruments are aimed at promoting the sustainable and equitable use of ecosystem services, guaranteeing the conservation of La Montaña PA.

In both cases, the recognition and valuation by local actors of the contribution of ecosystem services to local development and quality of life was key. It made them understand the importance of adequate PA management, thus encouraging the definition of conservation priorities, the design of equitable policies for participatory management, and the identification of funding opportunities. Both initiatives were supported by UNEP (LifeWeb) through the Mesoamerican PA Support Project.

#### References:

a: UNEP (2013). *Supporting protected areas in Mesoamerica: water*. Available at [www.pnuma.org](http://www.pnuma.org)





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Solid waste pollution in a peri-urban area of the Dominican Republic's touristic La Altagracia Province. The population of Central America, and particularly of the Caribbean, is increasingly concentrated in urban areas, placing considerable and growing pressures on the environment. For towns and cities that have not upgraded their waste treatment facilities, pollution is a major problem. (Wirestock, Inc./Alamy)

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Through the Inter-American Development Bank's emerging sustainable cities initiative (ICES), Managua in Nicaragua plans to expand urban parks and the protection or restoration of forests in the countryside. The measures aim to provide recreational spaces, create a buffer zone and connectivity corridors between the city and its rural surroundings, and mitigate flood and landslide risks due to runoff from nearby hills. (Dzmitry Kliapitski/Alamy)

## 4.6 URBAN NEEDS AND CONSERVATION

The most important link between the urban and rural realms lies in ecosystem services, as most of the beneficiaries of these services are concentrated in cities of countries with large urban populations<sup>215</sup> that require service delivery areas of between 500 and 1 000 times their own area. Conversely, the pressures on natural ecosystems are enormous (solid waste, water and air pollution, water and fuelwood consumption, habitat loss and fragmentation, etc.). Given the growing urbanisation in the region, it is important to promote the application of a landscape approach in the design of sustainable urban projects, taking into account their requirements and long-term impacts.

The Emerging and Sustainable Cities Initiative (ICES), supported by the IDB at the global level, promotes innovative proposals to address this issue. Within this framework, the IDB city network<sup>216</sup> has been formed, consisting of 27 cities in Central America, 9 in the insular Caribbean and 10 on the Caribbean coast of Colombia and Venezuela. The network fosters the dissemination and exchange of information focused on strengthening local, technical and management capacities in sustainable urban development. It also generates business and investment opportunities in this area, such as public-private partnerships. Mexico City, which is part of the network, has one of the most interesting programmes for urban sustainability.

<sup>(215)</sup> Carabias J., A. Mohar and E. Provencio (2008). Retos y riesgos en el uso de la biodiversidad, in Capital natural de México, vol. Conabio, Mexico, pp. 285-295.

<sup>(216)</sup> <https://www.iadb.org/es/desarrollo-urbano-y-vivienda/red-de-ciudades-bid>





#### Box 10. URBAN CENTRES AND ECOSYSTEM SERVICES: MEXICO CITY AND THE CLIMATE ACTION PROGRAMME<sup>a</sup>

In 2014, Mexico City was the first city in Latin America to implement a Climate Action Programme, which integrates compensation for ecosystem services, ecosystem restoration and biodiversity conservation into several of its components:

- The programme offers incentives and compensation to landowners for protecting natural resources and restoring degraded habitats. Almost 60 % of Mexico City's land area is dedicated to conservation, providing essential ecosystem services to the entire city.
- Focusing on pollution risks, the recovery programme for the Magdalena and Eslava rivers, two of the main sources of water in Mexico City, improves environmental conditions in two major tributaries and their surrounding areas. Additional funding helped secure a water supply for the city and reduce the energy and economic costs associated with traditional water treatment.
- Finally, a green roof programme aims to create 10 000 m<sup>2</sup> of new green roofs per year, to improve air quality, regulate humidity, reduce temperature and provide new biodiversity resources throughout the city. By increasing environmental awareness among citizens, the programme also plays an important educational role.

As a result of the programme, Mexico City is the only city in the region that is included in the Sustainable Cities Index (SCI), developed by ARCADIS<sup>b</sup>. In 2018, it ranked 79<sup>th</sup> globally among the top 100 cities, followed only by Sao Paulo and Santiago de Chile among Latin American cities.

#### References:

a: UNEP (2013). *Supporting protected areas in Mesoamerica: water*. Available at [www.pnuma.org](http://www.pnuma.org)

b: [www.arcadis.com](http://www.arcadis.com)





# #5

Priority  
actions ►

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*The red-eyed green frog (Agalychnis callidryas) is endemic to the tropical rainforests of Central America. Its conservation status is of little concern, but its natural habitat is under pressure from deforestation, pollution and global warming. The presence of this particularly sensitive species is a good indicator of environmental quality. (Dirk Ercken/Alamy)*

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*Cockpit Country is an important component of Jamaica's key landscape for conservation (KLC). Home to the largest block of rainforest in the Greater Antilles, it is the source of 40 % of the island's drinking water. It is also the refuge of the last populations of endangered endemic species such as the Jamaican black-billed parrot (Amazona agilis). An integrated planning vision is essential to control the pressures linked to tourism and natural resource use.*  
(Marcin Sylwia Ciesielski/Shutterstock)

## #5 \_ Priority actions

### 5.1 KEY LANDSCAPES FOR CONSERVATION

For each of the subregions covered in this report, priority geographies have been identified for the implementation of the proposed strategic approach. They contain central elements for conservation that contribute to the preservation of a range of species, ecosystems, ecosystem services and associated ecological processes within their natural range of variability. They also integrate areas of productive use, urban areas, infrastructure works and extractive industries. They provide an opportunity to integrate biodiversity conservation with sustainable development. For the purposes of this report, they have been called key landscapes for conservation (KLCs).

To select the KLCs, various sources of information were taken into account, including data from universities, NGOs or conservation institutions with a long history in the region. In particular, it is worth mentioning:

- 1 Global Priority Ecoregions (Global 200)<sup>217</sup>: based on the analysis of global biodiversity patterns, these are terrestrial, freshwater and marine ecoregions that are both home to exceptional biodiversity and representative of their ecosystems. Biodiversity characteristics among ecoregions are compared to assess their irreplaceability or distinctiveness. These characteristics include species richness, endemism, unusually high taxa, unusual ecological or evolutionary phenomena and global habitat rarity.
- 2 WWF priority areas<sup>218</sup>: each is identified as a habitat of irreplaceable and threatened biodiversity, or because it represents an opportunity to conserve large, intact remnants of an ecosystem, including a number of regional priority areas that are locally important and have a long history of conservation success.
- 3 Areas with remnants of intact forest or intact forest landscapes (IFL)<sup>219</sup>: these are an unbroken extension of natural ecosystems within the current forest zone, which show no signs of significant human activity and are large enough to maintain all native biodiversity, including viable populations of species in need of large areas.

<sup>(217)</sup> Olson D.M. and E. Dinerstein (2002). The Global 200: Priority ecoregions for global conservation. *Annals of the Missouri Botanical Garden* 89(2), pp. 199-224.

<sup>(218)</sup> WWF (2013). A Roadmap for a Living Planet. Available at [http://d2ouvy59p0dq6k.cloudfront.net/downloads/roadmap\\_sign\\_off\\_fin.pdf](http://d2ouvy59p0dq6k.cloudfront.net/downloads/roadmap_sign_off_fin.pdf)

<sup>(219)</sup> Potapov P., A. Yaroshenko, S. Turubanova, M. Dubinin, L. Laestadius, C. Thies, D. Aksenov, A. Egorov, Y. Yesipova, I. Glushkov, M. Karpachevskiy, A. Kostikova, A. Manisha, E. Tsybikova and I. Zhuravleva (2008). Mapping the world's intact forest landscapes by remote sensing. *Ecology and Society* 13(2), p. 51. Available at <http://www.ecologyandsociety.org/vol13/iss2/art51/>





- 4 WCS priority areas<sup>220</sup>: selected as biologically outstanding regions where long-term conservation of species and ecological processes is feasible.
- 5 Priority areas for the conservation of endemic bird species<sup>221</sup>: natural areas of bird endemism where the distributions of at least two species of birds of restricted range overlap. A restricted-range species is defined as one with a breeding area of no more than 50 000 km<sup>2</sup> (taking as reference the year 1800).
- 6 Priority sites of the Alliance for Zero Extinction (AZE)<sup>222</sup>: under the label of AZE sites, these are required to prevent the extinction of IUCN's endangered or critically endangered species, as they are the only remaining sites of habitat for these species.
- 7 CEPF's priority areas<sup>223</sup>, taking into account biological richness and the high degree of threats.
- 8 Consultation with specialists in the region (see Annex 1)

Based on the areas identified by the different sources, a prioritisation was made, in consultation with experts (see Annex 2) and according to the following criteria:

- Sites that conserve key ecosystems, important biological corridors, threatened, endangered, rare or endemic species;
- Sites that protect key ecosystem services for large numbers of people, e.g. drinking water, food production, disaster prevention, carbon sequestration;
- Sites that protect key ecosystems for particularly vulnerable human groups, e.g., indigenous groups, communities with traditional production models that have a high dependence on natural resources;
- Sites that have a high ecological or social value combined with particularly high relative rates of transformation, where conservation and ecosystem restoration efforts are most urgently needed;
- Sites where promising conservation and sustainable development initiatives are developed and can be enhanced.

<sup>(220)</sup> WCS (2016). Wild Places. Available at <https://www.wcs.org/our-work/places>

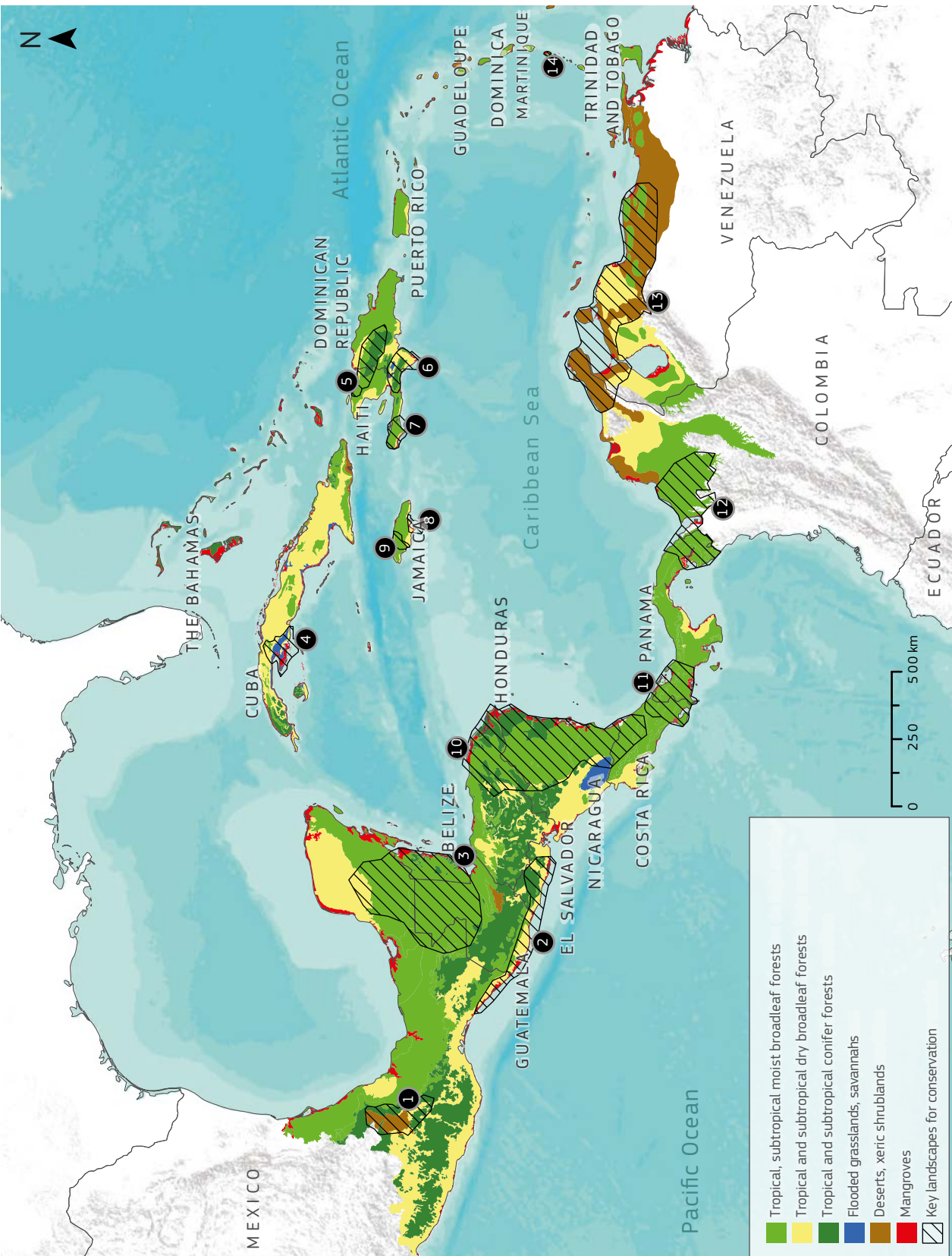
<sup>(221)</sup> Stattersfield A.J., M.J. Crosby, A.J. Long and D.C. Wege (1998). Endemic Bird Areas of the World: Priorities for Biodiversity Conservation represents an effort to document in detail the endemic biodiversity conservation importance of the world's Endemic Bird Areas. Birdlife Conservation Series 7, 846 pp. Birdlife International.

<sup>(222)</sup> Alliance for Zero Extinction (2010). Available at [www.zeroextinction.org](http://www.zeroextinction.org)

<sup>(223)</sup> Critical Ecosystem Partnership Fund (2010). Ecosystem profile: Caribbean Islands Biodiversity Hotspot. BirdLife International.



**FIGURE 7** Key landscapes for conservation in Central America and the Caribbean



Source: KLCs defined for this report; biomes from Olson, D. et al. (2001). *Terrestrial Ecoregions of the World: A New Map of Life on Earth*. *BioScience*. 51. 933-938



**TABLE 3** Key landscapes for conservation in Central America and the Caribbean

No on map	Key landscape for conservation
1	Deserts of Chihuahua and Tehuacán
2	Mesoamerican Pacific
3	Selva Maya
4	Ciénaga de Zapata Wetlands
5	Central Mountain Range – Northern Mountain Range, Haiti
6	Massif de la Selle – Bahoruco and Enriquillo Wetlands – Jaragua
7	Macaya Peak
8	Portland Bight Protected Area
9	Cockpit Country – North Coast Forest – Black River Great Morass
10	Atlantic isthmus rainforest
11	Talamanca and Pacific isthmus forests
12	Chocó-Darién rainforests
13	Venezuelan coastal mountain forests and xerophytic scrub
14	St Vincent Mountain Range

### 5.1.1 Central America subregion

**1. Deserts of Chihuahua and Tehuacán:** In comparison to other desert regions of the world, these deserts in south-central Mexico have an exceptional wealth of desert flora and fauna species, as well as a high degree of endemism. Some of the most species-rich cactus communities in the world are found in this ecoregion (between 500 and 1 500 species), as well as other plant species adapted to extreme climatic conditions, such as the creosote bush (*Larrea tridentata*), tarbush (*Flourensia cernua*), a type of spiky moss (*Selaginella lepidophylla*) and an acacia (*Acacia neovernicosa*). Animal species include the zone-tailed hawk (*Buteo albonotatus*), the banded gecko (*Coleonyx brevis*) and the reticulated gecko (*C. reticulatus*), as well as mammals such as the jaguar (*Panthera onca*), collared peccary (*Pecari tajacu*), desert cottontail (*Sylvilagus auduboni*), bighorn sheep (*Ovis canadensis*), mule deer (*Odocoileus hemionus*) and Nelson's kangaroo rat (*Dipodomys nelsoni*). The main pressures on this ecoregion are grazing; salt, gypsum and lime extraction; deforestation of riparian vegetation; and overexploitation of water sources. The conservation and restoration of riparian ecosystems for the protection of water resources, as well as

the preservation and adequate management of key ecosystem functions, are two of the main strategies to be promoted at these sites.

**2. Mesoamerican Pacific:** This landscape extends along the Pacific coast from southern Mexico to El Salvador and incorporates three main ecoregions: 1) the dry forests of Mesoamerica, 2) the dry Pacific mangroves of Mesoamerica and 3) the oak pine forests of Mesoamerica. The dry forests are the most diverse in the world and also have high levels of regional and local endemism. At least 50 plant species are endemic, as are numerous animal species, such as the red-banded tarantula (*Brachypelma smithi*). Some priority bird species include the orange-breasted bunting (*Passerina leclancherii*), the beautiful white-throated magpie-jay (*Calocitta formosa*) and the West Mexican chachalaca (*Ortalis poliocephala*), as well as species with a very restricted distribution such as the white-bellied chachalaca (*Ortalis leucogastra*), the blue-tailed hummingbird (*Amazilia cyanura*) and the giant wren (*Campylorhynchus chia-pensis*). Umbrella species include the jaguar (*Panthera onca*) and the yellow-naped parrot (*Amazona auropalliata*). The dry forests are subject to historic and intense pressures and are



totally fragmented. The main threats are urbanisation, tourism, exploitation of firewood and wildlife, and road construction, which favours the establishment of new settlements. The main conservation strategies should be focused on strengthening existing PAs, developing climate-smart agriculture programmes linked to ecosystem conservation and restoration processes in connectivity corridors, and providing alternatives to fuelwood for energy. In an area particularly vulnerable to the effects of climate change, all programmes should adopt mitigation and adaptation measures as a cross-cutting theme, with particular attention to risk management and drought resilience. Inter-agency coordination within a multisectoral approach is particularly important in order to ensure that policies and programmes for agricultural and forestry development, water management, adaptation, mitigation and biodiversity conservation are compatible. Finally, because of population and city growth, it will be important to manage biodiversity and ecosystem services in urban and peri-urban environments.

This landscape also contains remnants of Mesoamerican pine oak forests, which are preserved in patches on the summits and slopes of the highest mountains in Mesoamerica and contain some of the most extensive subtropical conifer forests in the world, with high levels of species richness and endemism. Because each forest island is so isolated, many of the species are found nowhere else in the world. Notable species include the imperial woodpecker (*Campephilus imperialis*), the dwarf jay (*Cyanocorax nana*), the volcano rabbit (*Romerolagus diazi*) and 2 species of wild maize (*Zea perennis* and *Z. diploperennis*). The main pressures affecting these forests are commercial timber extraction, the pine beetle epidemic, conversion of land to cultivation and livestock pressure, along with forest fires<sup>224</sup>. Priority strategies are part of a landscape-scale planning logic

and should include improving environmental governance, strengthening management systems for the sustainability of the timber chain, developing mechanisms to support production diversification and natural resource management processes (without land-use change), and generating incentives for conservation and restoration.

Finally, the dry Pacific mangroves of Mesoamerica extend along the coasts of Guatemala and El Salvador, with patches in Jiquilisco Bay, Estero de Jaltepeque, Punta San Juan, the Rio Paz, Rio Acome and Rio Lempa estuaries and behind the Barra de Santiago and Monterrico lagoons. They provide a habitat for many endangered species such as the white-fronted parrot (*Amazona albifrons*) and the yellow-naped parrot (*A. auropallata*), the latter being an umbrella species. They are also an important nesting site for a great diversity of birds and a development site for juveniles of many fish species, some of great importance to the fishing sector. Mangroves serve as a refuge for species that need protection during the dry season. Also, many species of sea turtles, freshwater turtles, iguanas, snakes and crocodiles use these ecosystems as feeding and/or breeding habitats. The main pressures are tourism development, the expansion of population centres, agriculture, cattle ranching, firewood extraction and the construction of salt and shrimp production ponds. In addition, the mangroves are affected by productive activities and urbanisation in the upper parts of the basins that feed them. Erosion linked to changes in land use is responsible for sedimentation processes; the use of fertilisers and pesticides by farmers, as well as urban and industrial sewage discharges, are sources of pollution. Outside of classical conservation and restoration programmes, it is essential to encourage spatial planning and sustainable management (e.g. in the aquaculture sector), as well as the development and

<sup>(224)</sup> Olson D.M. and E. Dinerstein (2002). Op cit.



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*The red-ringed tarantula (Brachypelma smithi) is endemic to the dry ecosystems of the Mesoamerican Pacific. With its striking looks and docile temperament, it is a target of international trafficking for the pet market. This, plus habitat degradation, has led to its current status as a near-threatened species. (Ger Bosma/Alamy)*

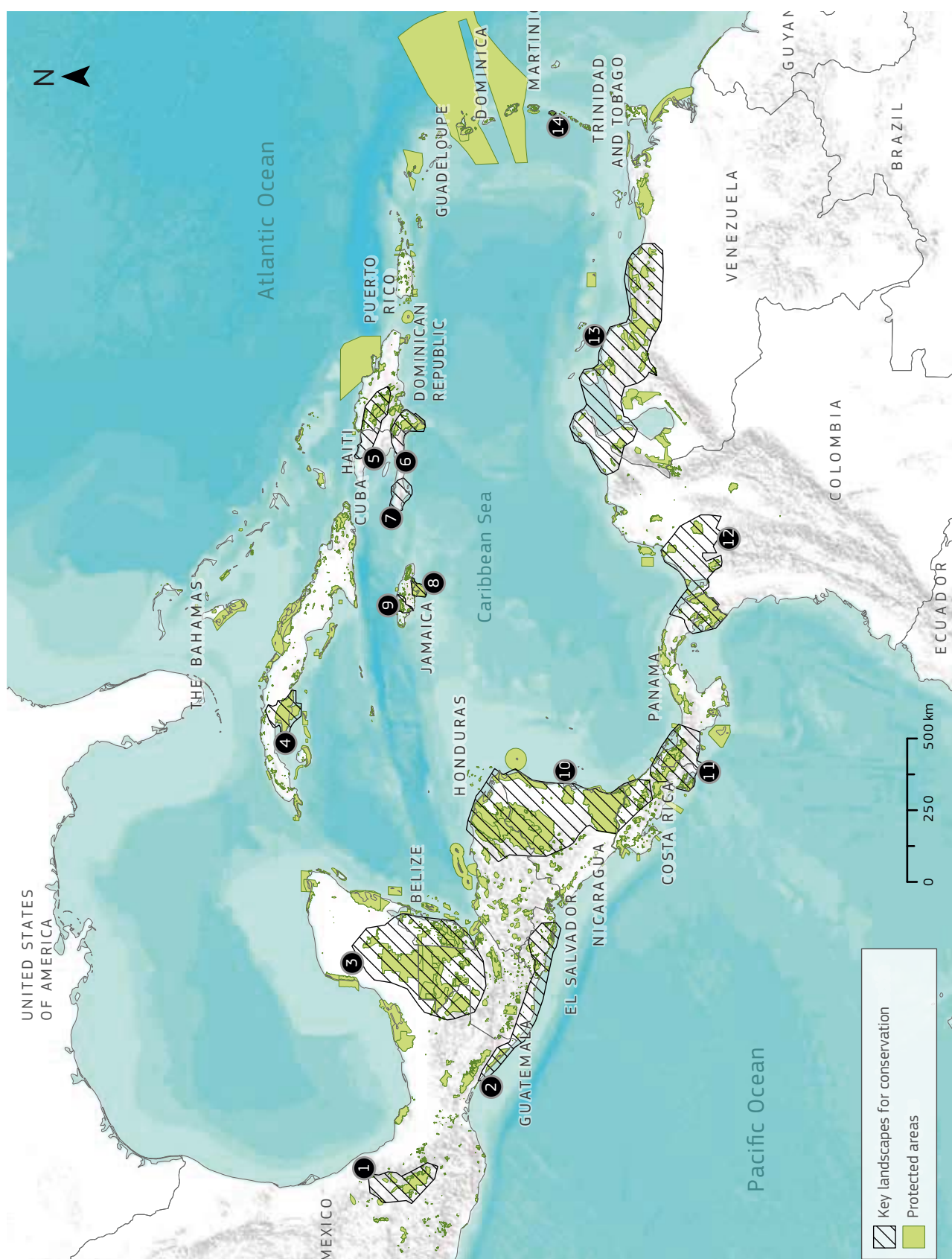
implementation of standards to reduce pressures. In particular, it is necessary to regulate and guide urban and tourist development by encouraging the adoption of biodiversity-friendly practices and reducing pollution and sedimentation levels.

**3. Selva Maya:** This KLC extends from Belize to northern Guatemala and across the Yucatan Peninsula in Mexico. It is the second largest block of tropical forest in the Americas (after the Amazon), and has an altitudinal variation that includes tropical mountain and lowland rainforests. It has a high level of endemism (11 species of mammals, 20 birds, 39 reptiles and 11 amphibians), as well as many species in danger of extinction, such as the jaguar (*Panthera onca*), Morelet's crocodile (*Crocodylus moreletii*), the Central American river turtle, or white turtle (*Dermatemys mawii*), the ocellated turkey (*Agriocharis ocellata*), the bay snook (*Petenia splendida*), the Guatemalan black howler monkey (*Alouatta pigra*), Geoffrey's spider monkey (*Ateles geoffroyi*) and other vulnerable species such as Baird's tapir (*Tapirus bairdii*), the white-lipped peccary (*Tayassu pecari*), the white-tailed deer (*Odocoileus virginianus*), the margay (*Leopardus wiedii*), the jaguarundi (*Herapilurus yagouaroundi*) and the southern mealy parrot (*Amazona farinosa*). The area is a major global carbon sink and a critical water catchment for the region. These forests occupy the lower and middle basin of the Usumacinta river, one of the most important basins in Central America. The area was the epicentre of the Mayan civilization and its 200 archaeological sites are an important source of income through the growing tourism sector. The main pressures on biodiversity in the Selva Maya are the expansion of cattle ranching, forest fires, illegal logging, illegal trade in flora and fauna, and the extension of the agricultural frontier. It is a difficult area to intervene in because of the presence of criminal groups engaged in drug trafficking and other illegal activities so, in this context,

it is essential to strengthen governance and apply a landscape approach, seeking to conserve natural ecosystems, ensuring biological connectivity (with a focus on umbrella species) and maintaining key ecosystem functions. To this end, it is as important to strengthen PA systems as it is to orient productive activities towards greater sustainability.

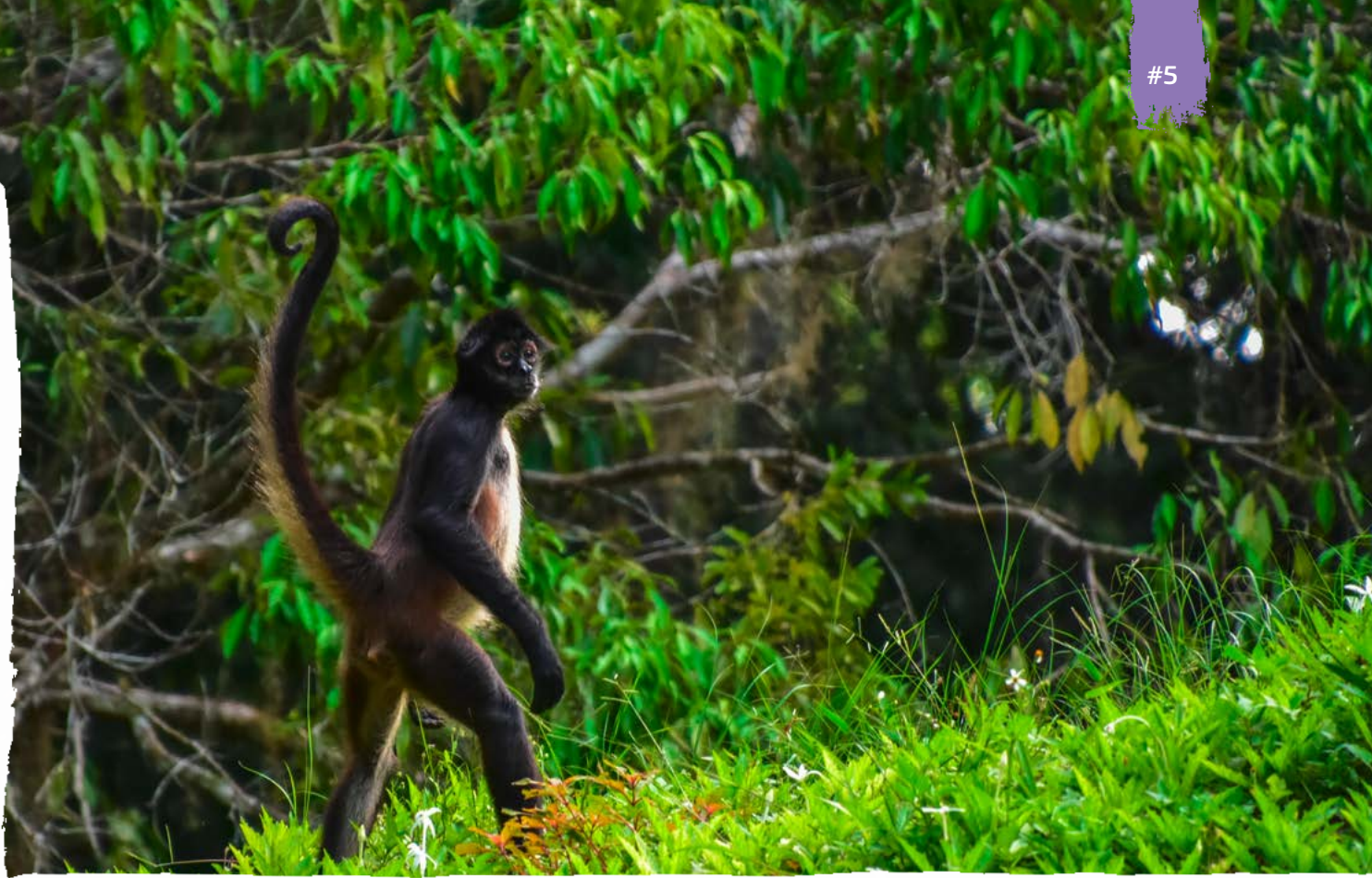
**10. Atlantic isthmus rainforest:** This KLC extends along the Atlantic coast of Honduras, Nicaragua and Costa Rica. The most important remnants of rainforest here have been classified as intact forest landscapes and include the most extensive rainforest PAs in the region. It presents a high diversity (e.g. at least 1 021 vertebrates), but low levels of endemism. It is an important migration route: neotropical migratory species comprise approximately 30 % of the bird population. Some distinctive species are the jaguar (*Panthera onca*), the great green macaw (*Ara ambiguus*), the white-lipped peccary (*Tayassu pecari*) and Baird's tapir (*Tapirus bairdii*). This ecoregion is the heart of the Mesoamerican Biological Corridor. It includes important PAs such as Río Plátano Biosphere Reserve (Honduras), Bosawás Natural Reserve (Nicaragua), Punta Gorda Indio Maíz Natural Reserve (Nicaragua) and Tortuguero National Park (Costa Rica). The main threat to the forests is the expansion of cattle ranching, which is combined with the absence of clear land tenure and illegal activities (especially those linked to drug trafficking), and works related to a project to build a transisthmian canal in Nicaragua. Priority conservation strategies include the development of better models of biodiversity governance (taking into account the consolidation of land tenure, the need for greater state presence, and the protection of environmental defenders), the conservation of forest remnants, and the promotion of climate-smart agriculture programmes and projects (including eliminating illegal cattle ranching in PAs and discouraging cattle

**FIGURE 8** Key landscapes for conservation and protected areas



Source: KLCs defined for this report; protected areas from IUCN – UNEP-WCMC Protected Planet (2020)





*The Central American spider monkey (Ateles geoffroyi) is an umbrella species of tropical forests because of its role in seed dispersal. Threatened by habitat loss, occasionally hunted for meat and captured for the pet trade, the species is considered endangered. Viable populations are still present in protected areas of the 5 great forests. (Prakich Treetasayuth/Alamy)*

ranching in other areas of high biological importance or for the provision of ecosystem services).

**11. Talamanca and Pacific isthmus forests:** These rainforests extend from the coastal plains of Costa Rica to the mountainous areas and west of Panama. The coastal part represents a regional centre of endemism for a wide range of plant and animal taxa. Many species have restricted ranges within this ecoregion. It includes important PAs such as Corcovado National Park (on the Osa Peninsula in southern Costa Rica), Santa Fe National Park (in Panama) and La Amistad Biosphere Reserve. This binational biosphere reserve is one of Central America's best examples of transboundary conservation, combining strict protection with multiple use management of the forest by the indigenous communities that inhabit the reserve. Umbrella species include jaguar (*Panthera onca*), white-lipped peccary (*Tayassu pecari*) and Baird's tapir (*Tapirus bairdii*). The main pressures are deforestation associated with timber exploitation and land conversion for agriculture and cattle ranching. In these sites, the main activities and strategies to be developed will have to involve the design of connectivity spaces as generators

of key ecosystem services; and the creation of mechanisms for payments for ecosystem services based on the results of landscape-scale planning and from the assessments made by the main actors about their priority services. Support is also recommended for projects that promote the regularisation of land tenure and associated services to ensure equity in PES schemes.

The Talamanca mountain forests' characteristic ecosystems are distinguished by their good level of conservation and the highest level of endemism in the subregion. More than 30 % of the ecoregion's flora is endemic to this area, including more than 10 000 species of vascular plants and 4 000 species of non-vascular plants. Trees of the laurel family (*Lauraceae*) dominate. The forest has trees of up to 50 metres tall, strongly dominated by two species of oak or holm oak (*Quercus costaricensis* and *Q. copeyensis*) with an understorey characterised by the presence of several species of dwarf bamboo (*Chusquea* spp.). More than half of the bird life in the highlands of Costa Rica and western Panama is endemic to this area, and almost 85 % of the bird species with restricted geographic distributions depend on these forests. Amphibian endemism is also high and at least 7





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*The Zapata Swamp on the southern coast of Cuba is the largest and best preserved wetland in the Greater Antilles. The swamp is home to a Ramsar site, a national park and a biosphere reserve. (© Rich Wagner/Alamy)*

mammals are considered endemic to this forest<sup>225</sup>. Steep slopes, relatively cold temperatures and remoteness have limited the impact of agriculture and human development in most of the area, making it one of the most intact forest landscapes in Central America (about 75 % of the original forest cover remains intact, with 40 % protected by national and international parks). However, the felling of forests for agriculture and livestock is putting some pressure on the ecosystems, as is the extraction of timber. Planning at the landscape level with particular emphasis on strengthening existing PAs, conserving key ecosystem services (such as water production in this particular case), and

promoting alternative activities such as sustainable tourism, will be central to conservation strategies for this site.

**12. Chocó-Darién rainforests:** The Panama-Colombia border is one of the lowland areas with the greatest diversity of species in the world: it has an exceptional abundance and endemism of plants, birds, amphibians and butterflies. It is also culturally diverse, home to numerous indigenous communities with strong links to their ecosystems. In addition, it is the only ecological zone with rainfall ranges of 4 000 to more than 9 000 millimetres per year. The Chocó is one of the largest active centres

<sup>(225)</sup> Ibid.





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*Valle Nuevo National Park, Dominican Republic, is located on a plateau over 2 200 metres above sea level, which emerged after the melting of a glacier that occupied the Central Mountain Range in the last Ice Age. Its vegetation is typical of the Nearctic ecozone, with many species endemic to the island of Hispaniola, and is considered a key biodiversity area. (© O. Langrand/CEPF)*

of speciation and endemism in the world. Its flora is estimated at a minimum of 8 000 species of vascular plants with almost 20 % of endemic species. At least 127 species of amphibians, 97 species of reptiles and 577 species of birds have been reported. The main PA extension in Chocó is Darién National Park (NP) (Panama), where the main umbrella species are the jaguar (*Panthera onca*), the white-lipped peccary (*Tayassu pecari*) and Baird's tapir (*Tapirus bairdii*). Conserving and improving the conservation status of umbrella species is a priority activity in this landscape. The Pan-American Highway is interrupted by the Darién, which gives the area a remote character that may favour conservation. The area is strategic for

connectivity with Central America, and suffers from a great deal of traffic and instability in the transition following the peace agreement in Colombia. The main pressures are migratory agriculture and the expansion of human settlements, as well as the overexploitation of some forest species and illegal mining. In this regard, it will be necessary to promote good agricultural practices, sustainable forest management, the strengthening of the rule of law and the development of governance models that include PES schemes that take into account the practices of traditional communities and peoples, with the aim of ensuring that such schemes are equitable and fair.





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*The developing coastline of St Vincent. The St Vincent Mountain Range comprises the largest portions of rainforest in the Lesser Antilles and is one of the few areas in the Caribbean with the entire altitudinal corridor from sea level to 1 200 metres. Infrastructure development is one of the main threats to this ecosystem, for which better environmental governance models will be critical. (Maurice Brandt/Alamy)*

### 5.1.2 Caribbean subregion and Caribbean coast of South America

**4. Ciénaga de Zapata Wetlands:** This is the largest and best-preserved wetland in the insular Caribbean. It extends to the south coast of Cuba and includes a Ramsar site, a biosphere reserve and a national park. Cuba's wetlands represent approximately 4 % of the island's territory and include habitats with unique and ideal vegetation for numerous species (manatees, crocodiles, fish and turtles, resident and migratory birds), including numerous endemic species in danger of extinction. It distinguishes the presence of three endemic bird species in the marsh: the Zapata wren (*Fermina cerverai*), Zapata rail (*Cyanolignas cerverai*) and Zapata sparrow (*Torreornis inexpectata*). Among the mammals, the greater bulldog bat (or fishing bat) (*Noctilio leporinus*), which is one of the largest in the Americas, the West Indian manatee (*Trichechus manatus*) and an endemic rodent,

the Zapata dwarf hutia (*Capromys nanus*), stand out. This wetland is subjected to numerous pressures. The most serious are drainage, agricultural expansion and associated pollution, charcoal production, grazing, peat extraction and invasion by exotic species. To increase the resilience of production systems to climate change and reduce the impact of agricultural expansion on the landscape, it is essential to promote more sustainable production practices and better management of natural resources. Agricultural and forestry development policies need to be made compatible with policies regarding water management, climate change mitigation and biodiversity conservation. The latter should include the conservation of umbrella species and the control of invasive alien species.

**5. Central Mountain Range – Northern Mountain Range Haiti:** this is located in the Dominican Republic and Haiti and is part of the Caribbean Biological Corridor. It includes 11 key





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*Mangroves in Los Haitises National Park, Dominican Republic. This coastal and marine park is home to a great diversity of endemic, native and migratory birds. Its mangroves are also a refuge for mammals, including the Hispaniolan hutia (*Plagiodontia aedium*), an endemic rodent at risk of extinction.*  
 (© O. Langrand)

biodiversity areas (Armando Bermúdez NP, Loma Nalga de Maco NP, José del Carmen Ramírez NP, Loma La Humeadora NP, Valle Nuevo NP, Ébano Verde NP, Plaisance NP, Morne Bailly NP, La Citadelle NP, Sans Souci NP, and Ramiers NP). It consists mainly of rainforests, with many endemic species, such as the critically endangered Dominican hawk (*Buteo ridgwayi*). The forests provide critical ecosystem services to downstream communities, particularly for the provision of freshwater, landslide and flood prevention, and forest products. José del Carmen Ramírez National Park is one of the sectors identified as an intact forest landscape in the region. The main pressures on the landscape are mining, crop expansion, grazing, fires and unsustainable extraction of timber, firewood, bird species and plants. Improving biodiversity governance models, enabling sustainable livelihoods and energy sources, conserving priority ecosystems and restoring key ecosystem functions are priorities to support conservation efforts in the Caribbean Biological Corridor.

## **6. Massif de la Selle – Bahoruco and Enriquillo Wetlands**

– **Jaragua:** Also in the Dominican Republic and Haiti, this KLC comprises 4 key biodiversity areas (Massif de la Selle, Lago Enriquillo, Sierra de Bahoruco and Jaragua National Park). It is part of the Jaragua-Bahoruco-Enriquillo Biosphere Reserve and is located in the Caribbean Biological Corridor. It maintains a complete altitudinal corridor and a high range of ecosystems, including not only important areas of coastal wetlands but also remnants of dry, humid and mountain forests. It is an important source of water for communities, including Port-au-Prince, and provides flood and landslide control services. It includes the Enriquillo wetlands, composed of a series of lagoons that are the remains of an ancient marine channel that divided the island more than 5 000 years ago. Lake Enriquillo is the largest and most hypersaline lake in all the Antilles. It consists of a depression 44 metres below sea level, surrounded by mountains and dry subtropical forests of great biological importance. The area is home to threatened or endangered species, such as Ricord's

iguana (*Cyclura ricordi*) and the rhinoceros iguana (*Cyclura cornuta*), as well as an endemic turtle, the Central Antillean slider (*Trachemys stejnegeri vicina*). The main threats are cattle ranching, firewood collection and the drying out of the wetlands by diverting fresh water for agriculture. The development of improved biodiversity governance models, as well as climate-smart agriculture programmes and the replacement of coal as an energy source are priorities in this landscape. These strategies should be combined with actions to reduce pressure from nearby urban centres and to control alien species.

**7. Macaya Peak:** Located in the southern sector of Haiti, this is part of the Macaya National Park, which contains the last remaining conifer forest in good condition in Haiti. These mountains reach a maximum height of 2 347 metres above sea level on Pico Macaya (the second highest point in Haiti after La Selle Peak). A source of water generation with a rich soil covered by dense coniferous forests, it is home to several endangered species, including birds that use it as a nesting site. It has a high biodiversity with numerous endemic species, such as the Hispaniolan Solenodon (*Solenodon paradoxus*). A landscape approach is recommended for the conservation of natural remnants (including control of invasive alien species), restoration of connectivity (with a focus on umbrella species), and maintenance of key ecosystem services such as the provision of water, and the development of alternative energies to firewood and charcoal.

**8. Portland Bight Protected Area:** this KLC extends along the south coast of Jamaica and includes 4 key biodiversity areas (Hellshire Hills, Portland Ridge and Bight, Brazillito Mountains and Milk River). It forms a corridor between remnants of dry forest and the coast, with the largest amount of mangrove forest in Jamaica. Hellshire Hills also comprises the largest area of dry limestone forest in the Caribbean and Central America. The management and restoration of the landscape is key not only to the conservation of its unique biodiversity but also to maintaining the livelihoods of people who depend on the resources of the coastal areas (mainly fisheries supplied by the Portland Bight mangroves). In the coastal area, establishing governance and spatial planning mechanisms is a priority, with regulations around tourism and the causes of sedimentation

and pollution (from fertilisers, pesticides, urban waste, etc.) in the upper parts of the basins. The conservation of umbrella species and the control of invasive alien species are other priority actions.

**9. Cockpit Country – North Coast Forest – Black River Great Morass:** Spread out across central Jamaica, this KLC has exceptionally distinctive island flora and fauna, with many species of unique genera and families. It comprises 5 key biodiversity areas (North Coast Forest, Cockpit Country, Catadupa, Lichfield Mountain and Black River Great Morass). Cockpit Country is the largest block of rainforest in Jamaica and the Greater Antilles. The area is a source of drinking water for 40 % of Jamaicans and has important flow and flood control functions. The main pressures are on non-timber forest resources and from tourism (as it is located adjacent to Montego Bay). It is essential to define governance models to conserve the key elements of biodiversity within this landscape and to ensure the production of ecosystem services, particularly water. Developing mechanisms for the development of biodiversity-friendly tourism is fundamental to all Caribbean island landscapes, and this site is no exception.

**13. Venezuelan coastal mountain forests and xerophytic scrub:** Located on the northern coast of South America, the mountain forests of the Venezuelan coast have remained isolated from other lowland forests because they are surrounded by dry or desert ecosystems. This has allowed the development of many unique plant and animal species with restricted distribution. In addition, many species of Neotropical migratory birds spend the winter there. The main threats to these forests include agricultural expansion, logging, burning and other pressures linked to population growth. As for the xerophytic scrub of Guajira-Barranquilla, it is a unique xerophytic area in the Neotropics, with a dominant vegetation of spiny trees and succulent plants. There are several endemic bird species restricted to the arid lowlands of the Guajira peninsula and north-eastern Colombia, as well as a large number of endemic land mammal species, such as the Guajira mouse opossum (*Marmosa xerophila*) and Hummelinck's vesper mouse (*Calomys hummelincki*). The main pressures on this ecoregion are agriculture and livestock, as well as coal and salt mining on the Venezuelan side.



It is essential to promote more sustainable production practices and better management of natural resources on a landscape scale. This requires agricultural and forestry development policies to be made compatible with those of water management, climate change mitigation and biodiversity conservation.

**14. St Vincent Mountain Range:** It extends in St Vincent and contains 7 key biodiversity areas (Colonarie Forest Reserve, Cumberland Forest Reserve, Dalaway Forest Reserve, Kingstown Forest Reserve, La Soufrière National Park, Mount Pleasant Forest Reserve and Richmond Forest Reserve). It comprises the largest portions of rainforest in the Lesser Antilles and is one of the few areas in the Caribbean that maintains the entire altitudinal corridor from sea level to 1 200 m. It is fundamental to the water supply of the entire island. The main pressures are agricultural expansion and infrastructure development. Improving the effectiveness of PA management and developing better environmental governance models will be critical at this site. PES schemes would enable improved water management. Likewise, there is an urgent need to reduce pollution and improve the management of waste from urban areas.

**Caribbean mangroves** (not shown on the map due to their geographical dispersion): These extend along the coasts of the insular Caribbean (most extensive in Cuba, followed by Hispaniola and Puerto Rico<sup>226</sup>) and the South American Caribbean. This landscape includes mangroves as well as permanent freshwater wetlands and seasonally flooded palm savannahs, whose fundamental characteristic is their adaptation to the high and strong tides to which they are subject. They are home to a high diversity of fauna, including large populations of fish and migratory birds. The main threats to this ecoregion are the development of oil refineries and chemical plants (particularly in Venezuela and Trinidad and Tobago), sedimentation, the expansion of urban and tourist facilities, and the extraction of firewood and wood for energy and construction. It is essential to promote territorial planning in these coastal areas, encouraging activities that are compatible with conservation, such as sustainable tourism. Upstream, it is important to improve productive and waste management practices in order to control sedimentation processes and pollution.

It should be noted that the region's coral reefs, particularly the Mesoamerican reef and the Jardines de la Reina reef in Cuba, although not mentioned in this KLC selection since the report focuses on terrestrial and freshwater ecosystems, must also be the object of conservation efforts due to the degree of threat that they face, their high biodiversity and the ecosystem services they provide.

## 5.2 PRIORITY INTERVENTIONS

The proposed strategic guidelines are part of a landscape approach of which the main objective is sustainable development based on integrated management of the territory (see section 4.1). It is proposed that intervention is structured around KLCs, which present a mosaic of natural ecosystems and areas of human activity (production areas, urban areas and others). Priority actions should consider short, medium and long-term programming to promote the sustainable use of the territory. They will not only seek to reduce the pressure on biodiversity, but also to increase the economic development options for inhabitants. In order to achieve this objective, 6 thematic areas have been identified for interventions. They complement each other, and can and should be adapted to the particular context of each KLC. These thematic areas address the targets of 3 major international initiatives:

- 1 Objectives of the Agenda 2030 for Sustainable Development<sup>227</sup>;
- 2 Aichi goals of the Convention on Biological Diversity<sup>228</sup>;
- 3 Climate change adaptation and mitigation processes and the Paris Agreement<sup>229</sup>.

<sup>(226)</sup> For the insular Caribbean, the mangroves identified as priority conservation objects of the CBC are considered key. See: Gerhartz Muro J.L. and Viña Dávila N. (19 September 2019, preliminary version). Selección de Objetos Prioritarios para la Conservación y el Monitoreo en el marco del Corredor Biológico en el Caribe (CBC). Proyecto Fortalecimiento del CBC.

<sup>(227)</sup> United Nations (2015). Transforming our world: the Agenda 2030 for Sustainable Development. Resolution adopted by the United Nations General Assembly on 25 September 2015, (A/RES/70/1). New York.

<sup>(228)</sup> Secretariat of the Convention on Biological Diversity (2011). Strategic Plan for Biodiversity 2011-2020 and the Aichi targets: living in harmony with nature. Convention on Biological Diversity, Montreal, Canada.

<sup>(229)</sup> Framework Convention on Climate Change (2015). Adoption of the Paris Agreement. Conference of the Parties 21st session. Paris, 30 November to 11 December 2015.

**FIGURE 9** Thematic areas of intervention for the conservation of biodiversity



**Thematic area 1: Conservation and restoration** of key ecosystems and species, to reverse damage caused by earlier interventions undertaken without sustainability criteria and to avoid additional damage to the functionality of ecosystems.

**Thematic area 2:** Promoting **sustainability in production systems and the tourism sector**, so that people continue to obtain ecosystem goods and services in a sustainable manner over time and space.

**Thematic area 3:** Management of biodiversity and ecosystem services in **urban and peri-urban environments**, to contribute to more sustainable and environmentally aware cities.

**Thematic area 4:** Good **governance** of territorial and protected area management processes, in particular by encouraging greater participation by local stakeholders.

**Thematic area 5:** Adequate **knowledge management** to strengthen the **environmental awareness** of the population and decision-makers, and to speed up processes through research, capitalisation of experiences, strategic communication and training.

**Thematic area 6:** Design and implementation of environmentally appropriate **public policies** at all levels of government institutions, in particular **territorial planning** that takes an ecosystemic, functional and intersectoral view of land use.

The main strategic actions recommended under each thematic area are set out below. It is important to underline that while their implementation is focused on the KLCs identified, many should be implemented or have implications at larger scales (sub-national, national and regional).



## 5.2.1 Conservation and restoration

The objectives pursued through this thematic area are the conservation of a representative sample of the region's ecosystems and their biodiversity, the maintenance of their capacity to provide key ecosystem services and the restoration of connectivity between the remaining patches of natural areas in good condition. They will contribute to an ecosystem-based climate change adaptation strategy aimed at reducing 'non-climate' stress. This makes sense in the regional context, where nature provides key infrastructure (e.g. coral reefs and mangroves limit coastal erosion in the face of sea-level rise and hurricanes).

PAs have proven to be an effective tool for biodiversity conservation. They provide important ecosystem services to human societies, particularly in the face of the effects of climate change, such as water and food supply, flood control, and soil and coastal protection. Compared to unprotected areas, public PAs have the advantage of being formalised through legal instruments and public policies, and of potentially having governance mechanisms and human and financial resources to ensure their management (although many PAs in the region have a serious lack of resources).

The consolidation of other effective area-based conservation measures (OECM) represents a great opportunity to expand protected areas<sup>230,231</sup>. The CBD defines them as:

*'geographically defined areas other than a protected area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity, with associated ecosystem functions and services and, where applicable, cultural, spiritual, socioeconomic and other locally relevant values'*.<sup>232</sup>

This definition applies to different set-ups, such as territories and areas conserved by indigenous and local communities, which stand out as one of the most effective (cf. section 4.3). Likewise, private PAs can be promoted, especially through adequate regulation, with simple requirements and economic incentives. A great diversity of areas subject to protection or sustainable management are also perceived as potential OECMs, including internationally recognised areas (e.g. Ramsar sites), water resource protection zones and other ecological easements, areas under forest management, areas with a fishing agreement, ecotourism development areas and others<sup>233</sup>. Agroforestry systems are among the OECMs that have great potential in the insular Caribbean, to increase habitat and/or allow many species to move around.

It is advisable to try to expand protected areas, particularly in El Salvador and Mexico, and islands such as Puerto Rico and Barbados, where the proportion of protected territory is low. The biomes that are most vulnerable or where a protected area is less than that established by the Aichi targets (17 %) should be prioritised, such as dry forests, coniferous forests, and xerophytic deserts and shrublands (see section 3.2.1). It would be important to also identify and protect sites where species are concentrated at key moments in their lifecycle. An example is fish spawning sites, which are often found outside PAs.

Strengthening the management of existing PAs and increasing their funding will also be key, ideally via self-financing (e.g. charging visitors) and increasing national budgets for PAs. Beyond ensuring the availability of adequate human, material and financial resources, it is important to apply a modern conservation approach. Although their main function is biodiversity conservation, PAs should contribute to the maintenance of traditional lifestyles and reducing poverty in local communities (indigenous and others). To this end, consideration should be given to the participatory management of PAs (see thematic area 4), with an emphasis on young people and women, as well as the participation of local actors in the planning processes, both at PA and landscape scales. The establishment of resource-managed PAs (IUCN category VI) and Biosphere Reserves (see Box 3) is particularly useful in developing governance models that are well adapted to this approach.

Territorial management processes should recognise the contribution of PAs to local development and promote their sustainable use for the benefit of local populations. Among the promising strategies for the region is putting a value on the attraction of PAs for ecotourism (especially in the Caribbean), and the payment for environmental services systems provided by PAs (especially hydrological services for cities). It is also recommended that national and local governments take PAs into account in their climate change response strategies. Conservation of the region's coastal ecosystems (mangroves, beaches, dunes, lagoons and keys), for instance, are essential to protect coastal communities and urban centres from sea-level rise and the effects of storms, whose frequency and intensity is predicted to increase with climate change<sup>234</sup>. In general, the dissemination of knowledge about the importance of ecosystem services is essential to raise the awareness of authorities and civil society on environmental issues (see thematic area 5).

<sup>(230)</sup> CBD/COP/DEC/14/8. Protected areas and other effective area-based conservation measures, Egypt, 30 November 2018.

<sup>(231)</sup> IUCN-WCPA (2019). Guidelines for Recognising and Reporting Other Effective Area-based Conservation Measures. IUCN, Switzerland.

<sup>(232)</sup> Convention on Biological Diversity (7 July 2018). Recommendation adopted by the subsidiary body on scientific, technical and technological advice 22/5. Protected areas and other effective area-based conservation measures. CBD/SBSTTA/REC/22/5. Available at <https://www.cbd.int/doc/recommendations/sbstta-22/sbstta-22-rec-05-en.docx>

<sup>(233)</sup> Sofrony C. (2019). Otras medidas efectivas de conservación basadas en área – Omec: Aportes del bioma amazónico a los desafíos post 2020. Proyecto IAPA – Visión Amazónica. Unión Europea, REDPARQUES, WWF, FAO, IUCN, UN/ONU Medio Ambiente. Bogotá, Colombia. 21 pp.

<sup>(234)</sup> A coastal forest 6 years old and 1.5 kilometres wide can reduce open ocean waves by 1 metre and coastal waves by 0.05 metres. Source: Kathiresan K. and N. Rajendran (2005). Coastal mangrove forests mitigated tsunamis. *Estuarine, Coastal, and Shelf Science* 65, pp. 601-606.



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*A great green macaw (Ara ambiguus) in flight, Nicaragua. Despite its trade being prohibited, the species is threatened by illegal trafficking. As well as being visually impressive, macaws play an important role in forest ecosystems, dispersing seeds to help tree regeneration. (Martin Mecnarowski/Shutterstock)*

Due to the intensity and complexity of the threats, PAs will not be able to stop the transformation of ecosystems, the loss of biodiversity and the degradation of their functionality. For instance, the conservation of mangroves and other coastal wetlands is dependent not only on local activities (e.g. construction of tourist infrastructure, shrimp production, etc.), but also on those higher up in the water basins (e.g. pollution from urban and agrochemical waste, sedimentation from riverine deforestation, etc.). A more integrated approach is needed to address these threats. Furthermore, in terrestrial environments and particularly in the most populated areas of the region, it is unlikely that PA coverage will be significantly expanded. In order to guarantee the long-term provision of ecosystem services essential to any development process in the region, it is essential to develop alternative conservation mechanisms outside the PAs' boundaries. The functional landscape conservation approach (see section 4.1) offers a suitable response.

It is prudent to seek a regional impact, through transboundary initiatives that contribute to increasing connectivity among PAs and promote reconciliation between conservation and sustainable development objectives. In this sense, it is recommended that efforts be focused on the Caribbean Biological Corridor (CBC) and the Mesoamerican Biological Corridor (MBC), as well as on the biosphere reserves and Ramsar sites.

Regional and international cooperation is also indispensable to combat wildlife trafficking. There is an urgent need to unify criteria at the intergovernmental level and to form joint border control commissions, involving both customs and police.

The implementation of priority ecosystem restoration plans, at different scales (landscape, national or regional), should become a priority in the region, aiming to boost the connectivity of ecosystems and landscapes. This is especially important in key sites for the production of ecosystem services (river banks, recharge areas, coastal ecosystems, wetlands and others) and in sites

where degradation has been most intense, such as in the insular Caribbean and in dry forests. These plans may include natural (passive) restoration activities, preferably, or else induced (active) activities. It is recommended that they be based on native and endemic species and include the management of invasive species (e.g. the use of exotic wood species for control), taking into account the severe impact of the latter on the whole region. They should also include, in the case of tropical conifer forests, the management of forest pests. Restoration can be promoted along with sustainable harvesting plans. Successful examples in the region include the restoration of mangroves in the Ciénaga de Santa Marta (Colombian Caribbean) and their use by local communities<sup>235</sup>.

Conservation strategies for umbrella species can also contribute to conservation at a landscape scale. These involve controlling or banning their use, preserving large natural areas and biological corridors at national and transnational scales. This also benefits, directly or indirectly, other species with lesser needs that inhabit the same areas. Conservation strategies may include:

- the creation of new protected spaces;
- consolidation of existing PAs and indigenous territories;
- participatory ecological restoration of degraded spaces;
- control of illegal exploitation and wildlife trafficking (including international strategies);
- promotion of good practices and local productive alternatives to minimise threats to the species or their habitats;
- drafting of sectoral agreements to avoid or minimise the impact of development and infrastructure projects;
- complementary *ex-situ* conservation measures such as germplasm banks, sanctuaries, etc.;
- regional agreements between countries for the protection of umbrella species in shared ecosystems.

Table 4 lists some of the umbrella species in the region, their main threats and key activities for their conservation.

(<sup>235</sup>) INVEMATE (2019). Monitoring of environmental conditions and structural and functional changes in plant communities and fishery resources during the rehabilitation of the Ciénaga Grande de Santa Marta. Final Technical Report 2019, Volume 18. Santa Marta 214 pp. Available at: <http://www.invemate.org.co/documents/10182/0/Informe+CGSM+2019/349f9473-d122-495e-85ac-cdfc5333fe00>



**TABLE 4** Some emblematic umbrella species in Central America and the Caribbean and priority actions for their conservation

Species	Habitat	IUCN Red List status	Threats	Activities
Scarlet macaw ( <i>Ara macao</i> )	Tropical humid forests from south-eastern Mexico to the foothills of central Bolivia; Extinct in El Salvador	Least concern (LC)	Illegal trade and loss of habitat; Mesoamerican subspecies <i>A. macao cyanoptera</i> highly threatened by poaching and habitat loss.	Protect nesting habitat; Control/eradicate poaching and trade.
Great green macaw ( <i>Ara ambiguus</i> )	From south-east Honduras to north Colombia and some isolated populations in Ecuador	Endangered (EN)	Loss of habitat and ecological connectivity; Felling of tonka bean tree ( <i>Dipteryx panamensis</i> ); Increase in monocultures; Extreme weather events; Theft of eggs and chicks.	Monitor the population; Environmental education; Sustainable agricultural production.
Three-wattled bellbird ( <i>Procnias tricarunculatus</i> )	Middle and upper levels of forests from southern Honduras to central Panama	Vulnerable (VU)	Loss of habitat and ecological connectivity.	Reforestation; Protect critical areas for nesting and resting; Environmental education.
Yellow-naped parrot ( <i>Amazona auropalliata</i> )	Forests of southern Mexico and northern Central America, including Guatemala, El Salvador, Honduras, Costa Rica, and Nicaragua	Vulnerable (VU)	Habitat loss; Traded nationally and internationally.	Monitor rates of habitat loss and degradation; Conduct awareness-raising activities to reduce exploitation; Increase the area of habitat under effective protection.
Ridgway's hawk ( <i>Buteo ridgwayi</i> )	Endemic to the island of Hispaniola, and some small adjacent islands	Critically endangered (CR)	Large-scale habitat loss due to the expansion of livestock, coffee and other plantations; Direct persecution.	Effective protection of Los Haitises National Park and the Cordillera Central de la Hispaniola; Breeding and release.
Cuban kite ( <i>Chondrohierax wilsonii</i> )	Endemic to the mountains of Sagua-Baracoa in Cuba	Critically endangered (CR)	Habitat loss; Decrease in population of snails that make up their diet; Direct persecution.	Raise awareness in the local population; Conserve and restore riparian forests; Protect mollusc fauna.
Baird's tapir ( <i>Tapirus bairdii</i> )	Tropical forests from south-eastern Mexico to the Gulf of Guayaquil in Ecuador	Endangered (EN)	Habitat destruction and hunting; Hunted locally for food and the pet trade; Hunted for sport in Costa Rica.	Boost environmental crime control; Conduct awareness-raising activities to reduce exploitation.
White-lipped peccary, mountain hog ( <i>Tayassu pecari</i> )	From the extreme south of Mexico to the north of Argentina. Now restricted to large, intact PAs in Mesoamerica. Extinct in El Salvador	Vulnerable (VU)	Loss of habitat due to the expansion of livestock, oil palm and agriculture; Hunted for sport and consumption.	Improve biological connectivity between PAs; Increase control of poaching; Improve monitoring capacity of species, from both research and local observations; Review national and local government policies and regulations regarding the conservation/use/protection of the species.
Jaguar, ( <i>Panthera onca</i> )	Forests and grasslands from the extreme south of the US state of Arizona through Central America to the north of Argentina, including most of the Brazilian Amazon	Near threatened (NT)	Loss of habitat and hunting; Although hunting has decreased, demand remains for jaguar legs, teeth and other products; Also killed due to conflict with livestock.	Improve biological connectivity: strengthening the jaguar corridor; population monitoring; awareness and conflict management of jaguars/livestock; traffic control.
Hispaniolan solenodon ( <i>Solenodon paradoxus</i> )	Endemic to the Dominican Republic and Haiti. Mainly conserved in the island's PAs	Endangered (EN)	Introduction of exotic predators (dogs, cats and mongooses); Habitat loss and degradation due to advancing agricultural frontier and the felling trees for charcoal and firewood.	Exotic mammal control; Stock recovery programmes.



In the Caribbean, rock iguanas (*Cyclura sp.*) and amphibians could also be considered as umbrella species, particularly frogs of the *Eleutherodactylus* genus, which is the most diversified in the West Indies. To these we can add sharks and sea turtles (*Chelonia mydas*, *Dermochelys coriácea* and *Eretmochelys imbricata*) in the marine environment.

#### Priority actions

- Technical support to PA management (capacity building in planning, monitoring and control, law enforcement, sustainable use of natural resources, conflict management, equipment and others);
- Strengthening of national and regional PA systems (development of legislative and institutional regulatory framework, capacity building, network development and monitoring);
- Expansion of the protected area via PAs or OECMs, in prioritised landscapes, with the criteria of ecological connectivity and the protection of key sites (e.g. breeding sites);
- Working towards greater participation in PA governance systems (see thematic area 4), promoting PA ownership and support for their conservation objectives by local stakeholders (communities established within or in the area of influence of the protection areas, authorities, organised civil society, private companies, etc.);
- Development of sustainable financing mechanisms for PA management and landscape restoration, including, if possible, mechanisms to ensure a contribution from the beneficiaries (PES mechanisms) or from those responsible for degradation (e.g. providing environmental safeguards in the regulatory framework, cf. thematic area 6);
- Production of quality information to feed the planning, follow-up and monitoring processes of landscape conservation and restoration programmes and PAs (see thematic area 5);
- Intergovernmental dialogue and coordination (between sectors and between countries) for the design and/or strengthening of regional conservation initiatives under the landscape approach (CBC, MBC, etc.), including the consolidation of the PA network and the restoration of priority ecosystems, within the framework of the REDD+ strategy if applicable (for countries developing this);
- Preparation of specific plans or programmes for the conservation of umbrella species (see Table 4). This may involve, for example, raising a flagship species such as the jaguar to the status of Latin American Natural Heritage;
- Strengthening national, regional and international strategies to combat wildlife trafficking;
- Design and implementation of comprehensive plans for the control, eradication and prevention of the entry of exotic species, pests and diseases that have critical effects on the region's ecosystems, and strengthening of intraregional collaboration in this area;
- Strengthening initiatives and regional collaboration on forest fire and natural disaster prevention, detection, response and restoration.



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*Ricord's iguana (Cyclura ricordi), Dominican Republic. On Caribbean islands, iguanas function as umbrella species. Ricord's iguana is endemic to the dry ecosystems of Hispaniola. It is threatened by habitat destruction, hunting and predation of juveniles by invasive species such as the mongoose. (Kevin Schafer/Alamy)*

## 5.2.2 Sustainable production and tourism

Most food production is no longer intended for local consumption and is processed before it reaches the consumer. A variety of intermediaries (input suppliers, processing and marketing companies, retailers) shape supply and demand to a large extent. Producers, large and small, often adapt their systems to the logic of short-term economic gain, for their immediate needs when they are in poverty, or to maximise their profits. For this reason, they expand production areas and practice highly input-dependent systems, generating significant environmental impacts. This is particularly common for large corporate producers of raw materials (oil palm, pineapple, beef, sugar cane, etc.), mainly destined for the international market.

The environmental impacts generated by this dynamic are significant and are aggravated by the effects of climate change. Added to this are the impacts of forest exploitation (wood, firewood and coal) and tourism, often developed without the adequate criteria of environmental sustainability (see section 2).

Intervention in the corresponding chains is necessary to favour the adoption of good practices at each link. In the prioritised landscapes the focus should be on the adoption of good practices. In particular, it is necessary to promote principles of management and sustainable use of ecosystems, land and water:

- adaptive management based on monitoring and early warning systems,
- fire prevention;
- preservation of environmental easements,
- maintenance of soil quality;
- efficient water management;
- integrated management of pests, diseases and weeds;
- reasonable use of agricultural inputs;
- forest management plans;
- alternative energy sources;
- waste management.

For example, in landscapes with a high population density, such as the Caribbean and the dry corridor of Mesoamerica, the priority is to conserve the remnants of natural vegetation and integrate them into a productive landscape matrix. This consists, among other things, of promoting a transition towards more sustainable productive systems such as silvopastoralism, agroforestry and sustainable forest management, which maintain high environmental functionality (e.g. for the habitat or transit of wild species). The need to adapt production systems for

climate change, to increase their resilience and to guarantee food security, is a good entry point for a constructive dialogue with all actors.

In the agricultural and forestry sectors, the main audience for the promotion of good practices should be production enterprises, as it is these that cause the greatest impact at the regional level. However, a specific approach is also needed for small-scale agriculture and family usage of firewood and charcoal, where these contribute to environmental degradation. Security of land and forest tenure is crucial in providing incentives for sustainable practices in these contexts. Work with small-scale producers is also important for the conservation of agrobiodiversity (genetic diversity of crops and diversity of means of production), which is often closely related to local culture. The promotion of value chains based on sustainably harvested biodiversity products ('biotrade') can provide communities with sources of income that encourage them to conserve the ecosystem. In the case of the forest concessions in the Selva Maya in Guatemala, forest products such as ramon, gum, pepper, xate and copal are marketed in addition to timber<sup>236</sup>.

Good practices should also be promoted in the other links of the chains (transport, processing and marketing). Sustainable production is closely linked to sustainable consumption. It therefore depends to a large extent on efforts to change consumption patterns, not only in LAC but also in importing countries. Good models include the sustainable production tables created at the global level (such as the Round Table on Sustainable Palm Oil<sup>237</sup>, or the Round Table for a Sustainable Cocoa Economy) and at national level (such as the National Platform for Responsible Pineapple Production and Trade in Costa Rica<sup>238</sup>, or the National Cocoa Platform in the Dominican Republic).

To promote best practices in the tourism sector, it is important to raise awareness and involve businesses (tour operators, hotel chains, transport companies, etc.), existing or new residents of tourism destinations, visitors and their governments, as well as destination governments. Interesting initiatives in the region include the Sustainable Tourism Zone of the Caribbean, promoted by the ACS, as well as the strategic plans for sustainable tourism development in Central America (2009–2013 and 2014–2018), prepared by SICA, and the Caribbean Sustainable Tourism Policy Framework (currently under revision), prepared by the Caribbean Tourism Organisation. Among other projects, SICA, with the support of WWF, promoted the Caribe Maya ecotourism

<sup>(236)</sup> Eke J., S. Gretzinger, O. Camacho, C. Sabogal and R. Arce (2016). Community Enterprise Forest Development. A practical guide for community forest promoters in the American Tropics. FAO, CATIE. Available at: <http://www.fao.org/sustainable-forest-management/toolbox/tools/tools-details/es/cj445779/>

<sup>(237)</sup> <https://rspo.org/>

<sup>(238)</sup> <http://pnp.cr/>



< *Trekking in a peri-urban forest in the Mombacho Volcano Nature Reserve, Nicaragua. Located near the city of Granada, the reserve is an increasingly popular tourist attraction. It includes a biological station and education centre where researchers give talks and workshops to aid the understanding and protection of natural resources. (Franck Cambi/Shutterstock)*

route, which received the 2016 Tourism Excellence Award at the Madrid International Tourism Fair. Although naturalist tourism has great potential, a greater sustainability of beach tourism must also be promoted as this dominates the region.

In general, the public sector has a fundamental role to play, through the suppression of perverse incentives, the implementation of incentive mechanisms for the adoption of good practices, the adjustment of the regulatory framework and the coordination between different sectors for the definition of sustainable development policies (see thematic area 6). For example, governments can implement public procurement policies for goods and services with sustainability and biodiversity criteria, and thus shape the production and consumption of such goods and services. Several countries in the region have made progress in this regard, such as Antigua and Barbuda, Colombia, Costa Rica, Mexico, Nicaragua and the Dominican Republic<sup>239,240</sup>.

Banks and investors (cf. section 3.1.2) are also important in promoting a transition towards a more socially and environmentally friendly development. Many apply due diligence mechanisms, and some have developed 'green' financial products for this specific purpose. Examples include the eco.business fund<sup>241</sup>, which is active in LAC, and the Green Fund<sup>242</sup> to combat climate change in the SICA region, with specific funds for micro, small and medium-sized enterprises in Central America.

Certification is a possible incentive for the adoption of good practices and alternative activities. This strategy can be adapted for different scales and sectors, for example, with organic certification for agricultural products, the Forestry Stewardship

Council or Programme for the Endorsement of Forest Certification labels for timber products, Blue Flag certification for beaches, and Rainforest Alliance certification for tourism enterprises (or other systems approved by the Sustainable Tourism Certification Network of the Americas). Several countries have also established national ecolabelling systems (e.g. Colombia, Mexico and Costa Rica).

#### Priority actions

- Include and monitor clauses promoting sustainable production in international trade agreements;
- Improve consumer and tourist awareness and promote responsible consumption (see thematic area 5);
- Develop good practice standards and guidelines for the productive and tourism sectors, taking into account a gender approach, and promote their application;
- Coordinate efforts between public agencies, academia, NGOs, companies and producers to make business practices compatible with the ecosystem and biodiversity conservation objectives proposed at the landscape scale;
- Create and/or strengthen national and global platforms for sustainable production, seeking massive participation of the primary productive sector;
- Develop marketing tools for sustainable ventures (market opening, trade linkages, certification, green labels, designation of origin, etc.) and adapted financial instruments – sustainable public procurement policies can give a great boost to these ventures;
- Strengthen the reliability of good practice certification systems (verification mechanisms, coverage of criteria, particularly in terms of biodiversity conservation, respect for human rights, etc.);

<sup>(239)</sup> UNEP (2017). Factsheets on Sustainable Public Procurement in national governments. Supplement to the global review of sustainable public procurement. Available at <https://www.oneplanetnetwork.org/sites/default/files/factsheets2017.pdf>

<sup>(240)</sup> <https://www.oneplanetnetwork.org/compras-sostenibles/countries>

<sup>(241)</sup> <https://www.ecobusiness.fund/en/the-fund>

<sup>(242)</sup> <https://www.sica.int/consulta/noticia.aspx?idn=113259dm=1dent=1>



- Develop the recognition of the rights of rural communities (indigenous, peasant, Afro-descendant and others) in environmental legislation;
- Promote the maintenance, registration and dissemination of traditional knowledge from indigenous production systems and the conservation of genetic materials of native plants with high food and medicinal importance;
- Control illegal or unsustainable activities; suspend economic incentives for unsustainable activities and implement incentives for the adoption of good practices;
- Coordinate intersectoral dialogue to promote an integrated approach in which policies for agricultural, forestry and tourism development, water management, biodiversity conservation and climate change mitigation are made compatible, and use these dialogues as a basis for integrated landscape management.

### 5.2.3 Urban and peri-urban environmental management

Cities depend on goods and services provided by ecosystems near and far (for food, building materials, energy, water, etc.). In the absence of adequate spatial planning, growing demand puts significant pressure on the environment. One example is the channelling and diversion of watercourses for urban consumption or electricity generation, which affect the mangroves, wetlands and flooded savannahs that the watercourses feed. At the same time, cities produce waste that, in the absence of adequate treatment, pollutes local or neighbouring ecosystems (e.g. sewage or solid waste dumped in rivers that ends up affecting coastal ecosystems) or at a global level (greenhouse gases). The extent of urban sprawl, particularly along the region's coasts, and of other related infrastructure also means significant processes for land cover and land-use change. At the same time, deforestation and certain agricultural practices higher up the water basin can affect the quantity and quality of water supply to cities.

Reshaping policies to increase the efficiency of 'urban ecosystems'<sup>243</sup> and reducing their demand for inputs, waste and emissions through circular economy models is already a global trend. A growing number of governments, donors and international organisations are adopting this approach, such as the IDB city network, in which many cities in the region participate (see section 4.6). The objective is usually to improve the quality of life of urban populations and transition to a green economy, generating a large number of jobs in public transport, renewable energy, protection against adverse weather conditions and the restoration of ecosystems<sup>244</sup>. These issues are the subject of efforts in other sectors of international cooperation; to avoid duplication of efforts we mention them here but do not identify priority actions.

Among the promising initiatives to mitigate the impact of growing urban demand is the implementation of payments made by the urban consumer for ecosystem services, such as water supply for consumption, production and hydropower generation. In this case, payment mechanisms agreed with water suppliers and consumers can help finance the protection of water sources (through reforestation actions, better production practices, etc.). It will be important to capitalise and replicate the experience of the Hydrological Environmental Services Programme in Mexico and other similar programmes developed in Costa Rica, Colombia and other countries in the region (see section 4.5).

On the other hand, whether due to a political will, topographical characteristics or accelerated and disorderly growth, natural spaces are often fragmented in the urban fabric or in the vicinity of cities. These remnant patches of forest, wetlands, lakes or other ecosystems continue to harbour specific biodiversity and can play an important role in the conservation of bird migration routes. They often provide important ecosystem services (water supply, soil protection, wave protection, recreation areas, etc.). This is the case, for example, in the city of Granada (Nicaragua), on the shores of Lake Cocibolca, where the Isletas and the Volcan Mombacho nature reserve are an important part of the city's tourist attraction. The preservation and management of these areas deserve particular attention, especially considering the tourist vocation of the region. In the urban planning processes, it is important to encourage the increase of vegetation coverage in urban environments, generating connectivity corridors through parks, roadways and other green areas, and thus contributing to the connectivity of ecosystems. Due to their proximity to urban populations, these areas can play a key role in strategies to raise awareness of environmental issues.

#### Priority actions

- Inventory and evaluate the state of conservation of urban and peri-urban natural spaces;
- Strengthen urban and peri-urban PAs;
- Elaborate and implement municipal policies for conservation and ecosystem management, including measures to minimise the border effects and conflicts between urban areas and PAs and nearby natural landscapes;
- Identify the ecosystem services provided, estimate their value and the actual costs of implementing measures to ensure their sustainability;
- Design and implement financing mechanisms for municipal environmental funds (payment for ecosystem services, corporate social and environmental responsibility, voluntary contributions);
- Design and implement education and communication strategies to boost the environmental awareness of the urban population.

<sup>(243)</sup> UNEP (2012). Sustainable, Resource Efficient Cities – Making it Happen.

<sup>(244)</sup> UNEP (2011). Towards a Green Economy: A Guide to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers. Available at [https://sustainabledevelopment.un.org/content/documents/126GER\\_synthesis\\_en.pdf](https://sustainabledevelopment.un.org/content/documents/126GER_synthesis_en.pdf)



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*Rosalina Dominguez, an environmental activist from the Rio Blanco indigenous community, Honduras. Various community leaders have been murdered or threatened for objecting to the construction of a hydroelectric dam in their ancestral lands. They campaign to defend their right to free, prior and informed consent for any project in their territory. (©Trocaire)*

## 5.2.4 Environmental governance

Defining and implementing efficient, equitable and locally adapted governance models is one of the biggest challenges for the conservation of natural resources. At a local level, they exert considerable influence over the maintenance of favourable conditions for the conservation of PAs and other valuable ecosystems, from financial, political and social points of view. At a national or regional level, they are indispensable for the effective implementation of international agreements, policies, strategies and regulations.

In all cases, experience indicates that the acceptance of environmental management standards requires a process of prior consultation, information and awareness. The adequate management of ecosystem services that are important to the local or regional economy (water sources, natural tourist attractions, fish resource reproduction areas and others) is a good starting point around which to build efforts to strengthen environmental governance. This involves establishing mechanisms that facilitate consultation with stakeholders and involve them in decision-making processes. In this process, it is important to take into account all landscape-related groups (even those not resident in the area) and their interests, which may be divergent. In the public sphere, it is essential to strengthen coordination between the different sectors (through the different ministries and institutions that depend on them), in order to make their objectives compatible with sustainability criteria. This logic of coordination and dialogue must be extended to local authorities and organisations.

Taking into account the existing power asymmetries in the region, special attention should be given to strengthening the access to information and the capacities of indigenous peoples, rural communities and civil society organisations in relation to environmental management, including with a gender focus, in order to increase their capacity for advocacy. Central America has areas with strong indigenous culture and interesting experiences of resource management autonomy. In regions where government entities lack personnel and budget, the participation of civil society (through NGOs, for example) is key to cover and/or strengthen environmental management.

Furthermore, there is an urgent need to ensure the safety of those who defend nature and to foster a culture of dialogue. Central America (especially Mexico, Honduras and Guatemala) and Colombia rank among the regions of the world with the highest number of murders of environmental activists and a higher degree of impunity. This serious gap in the rule of law does not facilitate participation and consensus for the governance of landscapes and PAs.

The effective implementation of policies and regulations is not possible without real political will, and requires an installed capacity for monitoring and control, as well as the existence of mechanisms that allow for possible offenders to be prosecuted. Experience shows that decentralising the responsibility for natural resource management and control over applying rules to the lowest appropriate levels (local governments and organisations, trade unions) is often a success factor because it generates greater ownership and responsibility on the part of those directly concerned. The closer management is to the ecosystem, the greater the responsibility, demands, accountability, partici-



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*Village of El Bendito,  
 Olopa, Guatemala.  
 In the buffer zone of the  
 Trifinio Fraternidad  
 biosphere reserve,  
 community members  
 plan land use for  
 sustainable coffee  
 production in the  
 framework of a  
 participatory  
 governance system.*  
 (© J.L.Urreal/CCAFS)



pation and use of local knowledge. However, local efforts must be integrated into coherent policies and territorial planning on a larger scale, following guidelines that ensure the functionality of landscapes, a responsibility that falls to the corresponding public institutions (cf. thematic area 6).

#### Priority actions:

- Promote governance systems that encourage collaboration between different sectors and levels of the state, in addition to the private sector and civil society (NGOs and others), and safeguard the rights of local actors (e.g. take into account the lessons of the FLEGT policy applied in the Honduran forest sector) (see section 3.1.2);
- Strengthen cross-border and regional coordination mechanisms related to environmental management (e.g. within the framework of SICA, the MBC and the CBC);
- Promote the application of inclusive models of PA governance (e.g. management committees), through appropriate legal frameworks, training and specific budget allocations. These should take into consideration agreements between environmental authorities and communities for the sustainable use of natural resources within PAs;
- Promote clarity and equity in the legal framework for land, water and forest resource tenure and use, as well as its effective implementation and control, in order to improve the sustainability of its management and reduce conflicts;
- Strengthen the territorial management capacities of sub-national governments and other management and control bodies at the sub-regional level in order to make the implementation of conservation policies effective;
- Strengthen the organisational, lobbying and management capacities of relevant civil society organisations, with a multicultural and gender approach, in order to promote citizen participation and control in environmental matters (e.g. citizen councils);
- Establish efficient systems for the early detection and resolution of conflicts, which also respond to the need for improvements in the security conditions of those who defend the environment, taking into account the guidelines of the Escazú Agreement (regional agreement on access to information, public participation and access to justice in environmental matters in Latin America and the Caribbean)<sup>245</sup>;
- Strengthen the capacities of judicial systems to deal with environmental crimes. Promote coordination with security institutions where conservation objectives conflict with criminal or other interests;
- Strengthen the territorial management capacities of territorial organisations, especially indigenous groups in collective territories, and guarantee the application of ILO Convention 169, particularly with regard to free, prior and informed consent. It is important to involve rural communities in land-use planning at the landscape level, considering the implications for their own territories;
- Improve transparent access to information for all stakeholders (thematic area 6), including by promoting the signing, dissemination and implementation of the Escazú Agreement.

245 <https://www.cepal.org/es/acuerdodeescazu>



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*Team picture from a meeting of the EU-funded BIOPAMA programme, Jamaica. BIOPAMA supports the Caribbean Observatory as a resource hub to support better decision-making for more effective protected area management and biodiversity conservation.*  
 (© BIOPAMA)

## 5.2.5 Knowledge management and awareness

There is an urgent need to drive the transition towards more sustainable development models adapted to climate change. Civil society and decision-makers must be aware of and have access to the best available information, in order to understand the vital role of biodiversity in these models.

There are still major gaps in information and knowledge in the region regarding biodiversity conservation and land management. In addition, knowledge is fragmented among universities, technicians from NGOs and government institutions, local populations, etc. The lack of synergy between the production of knowledge and the generation and implementation of public policies is a major obstacle. There is a need to invest in the generation of scientific and technological knowledge, and to promote the science-policy interface on the links between biodiversity, ecosystem services and human well-being.

An important challenge is to generate spaces for the dissemination and adequate use of knowledge, to make access to information more widely available. In particular, scientific information produced with public funds must be made accessible to all. Participatory governance (see thematic area 4) can only be achieved with equitable access to information. Several countries in the region committed to these principles by signing the

Escazú Agreement in 2018. Initiatives such as the Panama Biomuseum make it possible to raise awareness among a broad public of the value of biodiversity for human society.<sup>246</sup>

The development and/or strengthening of knowledge management networks will help to overcome these shortcomings. They can link the different institutional and sectorial environments and feed consultation and decision-making processes<sup>247</sup>. To avoid the duplication of efforts, it is preferable to prioritise existing international thematic platforms (e.g. IPBES, Global Forest Watch, Panorama Solutions, Platform for Agrobiodiversity Research and Open Foris, among others) and the different national and regional platforms (e.g. observatories supported by BIOPAMA in the Caribbean and the CBC information system, CONABIO's geoinformation system in Mexico, etc.). A coordination effort at regional level is recommended, for the standardisation of methodologies used by these entities and the generation of comparable information.

It is also necessary to rescue and re-evaluate pre-existing information, including cultural heritage, oral memory, and the traditional knowledge and practices of indigenous communities and rural dwellers, linked to the use of natural resources. Apart from its importance for the sustainability of the groups' way of life, such knowledge can contribute to designing models of good productive practices and climate change mitigation measures that can be reproduced or adapted to other contexts, as well as

<sup>(246)</sup> <https://www.biomuseopanama.org/>

<sup>(247)</sup> Albornoz M. and C. Alfaraz (2006). Knowledge networks; construction, dynamics and management. Ibero-American Network of Science and Technology Indicators (RICYT) of the Ibero-American Science and Technology for Development Programme (CYTED) and the UNESCO Regional Bureau for Science in Latin America and the Caribbean.



generating benefits in various sectors such as health. Its revaluation requires traditional knowledge management processes coordinated at national and regional level, for example through programmes and platforms in which communities as well as bodies linked to research and education participate.

Along the lines of the Nagoya Protocol, of which several countries in the region are members, strengthening the operationalisation of measures for framing access to and participation in the benefits of genetic resources should allow for greater valorisation of traditional knowledge. The private sector can also contribute to this objective, for example by joining networks such as the Union for Ethical BioTrade<sup>248</sup>. The GEF funded project 'Advancing the Nagoya Protocol in countries of the Caribbean (2016-2019): Fair and equitable Access and Benefit Sharing (ABS) of genetic resources and effective participation of local communities and indigenous people' is an interesting example. It supported 8 Caribbean countries to:

- 1 create or enhance capacities in governance and management of genetic resources derived from biodiversity;
- 2 design and validate practical guidelines and contractual models to facilitate arrangements for genetic resources and benefits sharing;
- 3 develop ABS policies and legislation for Antigua and Barbuda and St Kitts and Nevis to ratify the Nagoya Protocol. A platform was also created to promote the Nagoya Protocol in the Caribbean.<sup>249</sup>

The strengthening of cooperative initiatives within the framework of regional networks would make the best use of resources for conservation, particularly in the small island developing states of the Caribbean. In particular, it would facilitate the generation and exchange of information to monitor the state of the environment and for adaptive management, indispensable in the face of a rapidly evolving reality.

### Priority actions

- At the regional level, promote research and systematisation of information (traditional and scientific sources) and establish and/or strengthen mechanisms for its dissemination at the regional level (e.g. socio-environmental observatories), in order to encourage and facilitate decision-making at the supranational level. The following topics are highlighted:
  - Create a baseline of the conservation status of biodiversity (e.g. changes in cover), of key species (e.g. migratory and resident birds, jaguar, white-lipped peccary, macaws and others), of the current status of natural resources and the capacity to provide the main ecosystem services in the KLCs;
  - Evaluate the provision of ecosystem services that contribute to socio-economic development processes

and quality of life (at local, national and regional levels);

- Improve the knowledge on the socio-cultural characteristics and organisational system of each KLC's population;
- Assess the impact of human activities (production, infrastructure development, tourism, etc.) and associated phenomena (e.g. spread of invasive species, fires) that positively or negatively influence the capacity to provide ecosystem services;
- Describe the illicit activities (in particular illegal mining, timber and wildlife trafficking) and evaluate control strategies;
- Implement a communication/information/awareness-raising strategy aimed at decision-makers from all sectors and levels of government, the private sector, academia, consumers and civil society in general, in order to:
  - encourage public interest and mobilisation in favour of protecting biodiversity. Children and young people are an important target group for generating short and long-term changes;
  - strengthen the capacity of local or indigenous communities to defend their access to resources, with culturally appropriate communication strategies;
  - facilitate interinstitutional and inter-sectoral dialogue and coordination;
  - strengthen the relationship between science and policy to ensure that the extensive scientific knowledge available is used in decision-making and the definition of public policies that contribute to biodiversity conservation;
  - encourage the private sector to adopt more sustainable practices;
- Promote training programmes on the proper management of the territory and biodiversity, in particular for:
  - public administrations at the sub-national level and institutions in charge of supervising the application of environmental regulations (land use, use of wild resources, management of impacts on works and extractive projects, etc.);
  - PA managers, including local communities within or adjacent to PAs and other local stakeholders involved in co-management mechanisms (possibly developing a continuous training programme through existing mechanisms such as REDPARQUES);
  - students from all fields related to land use (biology, tourism, agronomy, forestry, technical careers for the hydrocarbon and mining industries, etc.), incorporating notions of conservation and the sustainable use of natural resources.

<sup>(248)</sup> <https://www.ethicalbiotrade.org/>

<sup>(249)</sup> <http://www.abscaribbean.com/>



### 5.2.6 Public policy and environmental planning

Having adequate public policies and a legal framework is fundamental for countering the trend towards environmental degradation in the region. The countries of the region have ratified practically all the international treaties on environmental matters (CBD, CITES, the United Nations Framework Convention to Combat Desertification and the UN Framework Convention on Climate Change, among others); they also have a large number of national and local environmental regulations. However, much work remains to be done to ensure that environmental policies are implemented efficiently and that development policies do not contradict them.

Policy development or reform relevant to biodiversity conservation should be more inclusive. Participatory territorial planning processes should be strengthened in the region, integrating conservation initiatives into these processes, to ensure their formal recognition and social legitimacy. The region's large biological corridors (MBC, CBC, the jaguar route) and biosphere reserves provide frameworks for integrating and harmonising

environmental institutions and their policies with those that govern other sectors (agriculture, tourism, infrastructure, hydrocarbons, mining, etc.). Strengthening their technical bodies is an important task so that they can help translate political initiatives into operations.

It is important to harmonise the different levels of land-use planning (local, regional, national and cross-border) in order to work at an ecologically appropriate scale. To this end, it is recommended that environmental integration between the different countries be consolidated within existing bodies for this purpose, such as CCAD, the Central American System of Protected Areas (SICAP), CARICOM and others (see section 3.1.1). To encourage more concrete multi-country cooperation, priority can initially be given to the management of pressing needs in shared ecosystems, such as transboundary or fishing areas. Examples of such initiatives are environmental management in the border area under the binational cooperation programme between Haiti and the Dominican Republic, and the sustainable management of the binational Coco river basin, between Honduras and Nicaragua.



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*Oil palm plantation, Costa Rica. The expansion of African palm plantations is putting pressure on Central America's forests, as are other types of large-scale production such as pineapple cultivation and cattle-ranching. Applying trade rules that include sustainability criteria could encourage the adoption of a regulatory framework, and appropriate local and international policies should encourage the sector to adopt good production practices to reduce its impact. (Reuters/Alamy)*

There is also a need to develop new sources and sustainable funding mechanisms to provide incentives for conservation. To this end, the CBD recognises 5 innovative financial mechanisms<sup>250</sup>:

- 1 Environmental fiscal reform: taxes, fees and charges aimed at increasing national budgets for conservation (e.g. tax on the tourism sector that finances Belize's environmental fund; fuel tax that finances PPSA in Costa Rica and others);
- 2 Mainstreaming biodiversity into development financing: can promote private sector involvement to complement public sources, both in the form of grants and loans;
- 3 Environmental safeguards: include these in the budgets of development programmes and project budget lines aimed at avoiding, minimising, restoring and compensating for socio-environmental impacts;
- 4 Market development for green products (see thematic area 2): there are initiatives at different scales in the region, involving both small producers (coffee, cocoa) and agro-industrial companies (pineapple, palm oil, meat). Sustainable public procurement strategies have great potential to develop these markets;
- 5 Payment for ecosystem services (see section 4.5): there are interesting examples at different scales in the region and these currently represent a significant source of conservation funding (e.g. national fund for forest financing in Costa Rica, public payment schemes for private landowners in Mexico, water funds such as Yaque del Norte in the Dominican Republic<sup>251</sup>, among others).

Apart from the payment of incentives and compensation, these mechanisms could feed emergency funds for conservation. They would represent a flexible and accessible source of funding in times of crisis, counteracting impacts and avoiding irreversible damage. They should have streamlined procedures for case/proposal analysis and rapid disbursement. Some examples of recent crises to which they could respond include forest fires, river contamination by palm companies, PA encroachments and others.

Funds for mitigation and adaptation to climate change should also be used more strategically to generate co-benefits for biodiversity. Nature-based solutions have a high potential to respond to various climate change challenges (carbon sequestration by forests, coastal protection against hurricanes by mangroves, etc.). They are generally cost-effective and

technologically adapted to the local context, but they currently receive only a fraction of these funds.

It should be noted that the conservation incentive mechanisms currently implemented by different governments – in the form of payment for environmental services, carbon payments, and marketing and promotion of sustainable natural assets – no longer compensate for the increase in land value in Costa Rica, Panama and other attractive coastal areas of the MBC. The mechanisms need to be continuously improved and reinforced with other measures in order to adapt to changing contexts.

Among the important public policies for the maintenance of ecosystem functionality in the region's territories, those that are particularly valued are the ones that promote the adoption of the most sustainable production models, the expansion of the protected area (e.g. with private PAs), the consolidation of existing PAs, the ecological restoration of degraded areas and the sustainable management of water (guaranteeing equitable access to this resource).

#### Priority actions

- Promote participatory land-management processes and their integration at different scales (including cross-border), taking into account biological connectivity needs;
- Encourage the adoption or strengthening of environmental safeguards in development projects before international bodies (e.g. SICA), and national and sub-national authorities;
- Encourage and/or strengthen the application of sustainable conservation financing mechanisms in KLCs (environmental fiscal reform, payment for ecosystem services, sustainable public procurement and others), including emergency funds;
- Favour nature-based solutions for climate change mitigation and adaptation, to ensure co-benefits for biodiversity and the communities which depend on it;
- Strengthen the mechanisms of environmental control and monitoring to guarantee adequate implementation of the different public policies and respect for the current legislation related to environmental conservation.

<sup>(250)</sup> OECD, World Bank, GEF and the European Commission (2012). Finance Mechanisms for Biodiversity: Examining Opportunities and Challenges. Co-Chairs' Summary of an International Workshop convened by the OECD, World Bank, GEF and the European Commission, together with Sweden and India. 8 pp. Available at <https://www.cbd.int/doc/meetings/fin/wsfmb-eoc-01/official/wsfmb-eoc-01-chairs-summary-en.pdf>

<sup>(251)</sup> <https://fondoaguayaque.org/>







A scuba diver in a black wetsuit and mask is swimming horizontally across the upper left portion of the frame. The diver's head is tilted slightly down, and a bright light emanates from their mask area. Below the diver, a diverse and colorful coral reef ecosystem is visible, featuring various types of coral including branching, brain, and fan corals in shades of orange, yellow, and green. The water is a deep, clear blue, and the overall scene is illuminated by natural sunlight filtering down from the surface.

# Annexes

*Coral reefs provide important ecosystem services and are among the main tourist attractions in Caribbean countries, yet they are under pressure from threats such as ocean acidification and warming, overfishing, dredging and quarrying, and coastal pollution. Their gradual degradation is a cause for concern in this region and around the world. (© Helmut Corneli/Alamy Stock Photo)*



**ANNEX 1** Central American and Caribbean ecoregions and the number of species they harbour

Biome	Ecoregion	# Maximum bird species	# Maximum plant species	# Maximum amphibian reptile species
Tropical and subtropical broadleaf rainforests	Catatumbo moist forests	403	1 900	102
	Central American Atlantic moist forests	429	4 100	240
	Central American montane forests	303	3 500	202
	Chiapas montane forests	325	3 800	109
	Chimalapas montane forests	294	2 500	53
	Cordillera La Costa montane forests	584	3 700	102
	Costa Rican seasonal moist forests	373	3 300	176
	Cuban moist forests	251	3 500	190
	Eastern Panamanian montane forests	327	3 300	190
	Hispaniolan moist forests	217	3 800	228
	Isthmian-Atlantic moist forests	518	8 000	292
	Isthmian-Pacific moist forests	407	6 500	256
	Jamaican moist forests	207	2 800	62
	Leeward Islands moist forests	134	1 500	84
	Magdalena-Urabá moist forests	517	4 500	217
	Oaxacan montane forests	323	3 200	161
	Centla Swamps	360	1 900	77
	Peten-Veracruz moist forests	468	6 500	384
	Puerto Rican moist forests	181	1 800	70
	Santa Marta montane forests	459	1 600	73
	Sierra de los Tuxtlas	436	2 750	142
	Sierra Madre de Chiapas moist forests	315	4 100	206
	Talamancan montane forests	450	8 500	254
	Veracruz moist forests	341	6 000	240
	Veracruz montane forests	328	2 700	81
	Windward Islands moist forests	158	1 600	88
	Yucatan moist forests	359	1 600	226



## ANNEX 1 (continued)

Biome	Ecoregion	# Maximum bird species	# Maximum plant species	# Maximum amphibian reptile species
Tropical and subtropical broadleaf dry forests	Balsas dry forests	264	4 300	244
	Central American dry forests	330	3 300	166
	Chiapas Depression dry forests	188	2 100	180
	Cuban dry forests	246	2 500	182
	Hispaniolan dry forests	214	1 500	228
	Jamaican dry forests	200	1 100	58
	Lara-Falcon dry forests	334	900	18
	Lesser Antillean dry forests	344	200	110
	Maracaibo dry forests	397	1 500	24
	Panamanian dry forests	273	1 900	100
	Puerto Rican dry forests	181	900	100
	Sinú Valley dry forests	396	1 100	236
	Southern Pacific dry forests	299	4 000	369
	Veracruz dry forests	295	1 100	116
	Yucatan dry forests	295	1 150	168
Tropical and subtropical conifer forests	Bahamian pine mosaic	218	750	84
	Belizian pine forests	272	1 500	73
	Central American pine-oak forests	349	4 900	347
	Cuban pine forests	249	1 500	162
	Hispaniolan pine forests	214	2 200	152
	Miskito pine forests	240	1 800	0
	Sierra Madre de Oaxaca pine-oak forests	447	3 100	167
	Sierra Madre del Sur pine-oak forests	330	4 200	295
	Sierra Madre Oriental pine-oak forests	336	3 300	217
	Trans-Mexican Volcanic Belt pine-oak forests	335	4 900	290

**ANNEX 1** (continued)

Biome	Ecoregion	# Maximum bird species	# Maximum plant species	# Maximum amphibian reptile species
Deserts and xerophilic scrub	Araya and Paria xeric scrub	339	1 400	6
	Caribbean shrublands	203	320	178
	Cuban cactus scrub	244	900	183
	Guajira-Barranquilla xeric scrub	387	900	88
	La Costa xeric shrublands	395	1 700	18
	Meseta Central matorral	216	3 500	162
	Motagua Valley thorn scrub	115	1 400	158
	Paraguana xeric scrub	316	1 200	16
	Tehuacán Valley matorral	169	2 700	111
Mangroves	Amazon-Orinoco-Southern Caribbean mangroves	113	200	57
	Bahamian-Antillean mangroves	164	200	642
	Mesoamerican Gulf-Caribbean mangroves	106	200	273
	Northern Mesoamerican Pacific mangroves	85	200	0
	South American Pacific mangroves	87	200	148
	Southern Mesoamerican Pacific mangroves	92	200	220
Flooded grasslands and savannahs	Cuban wetlands	250	900	132
	Enriquillo wetlands	206	400	108
	Orinoco wetlands	303	1 100	22



## ANNEX 2 Results of consultations

During the consultation process, the specialists prioritised sites of importance for conservation. The prioritisation exercise was based on four criteria and used a scale of 1 to 3 where 1 is 'low priority', 2 'medium priority' and 3 'high priority'. The criteria were as follows:

- A Sites that conserve key ecosystems, important biological corridors, and threatened, endangered, rare and/or endemic species.
- B Sites that have the highest relative rate of transformation, where conservation and ecosystem restoration efforts are most urgently needed.

- C Sites that protect key ecosystem services for many people (e.g. drinking water, food production, disaster prevention, carbon sequestration).
- D Sites that protect key environments for highly vulnerable human groups (e.g. indigenous groups, communities that follow traditional production models with a high dependence on natural resources).

The results of the prioritisation, provided by the 11 people who carried out the exercise, are shown below.

Sub-region	Site	Average				Summation			
		A	B	C	D	A	B	C	D
1	Selva Maya	2	2	2	2	14	9	9	11
	Moist forest of the Atlantic isthmus	2	2	2	2	14	9	8	12
	Forests of Talamanca and the Pacific isthmus	2	2	2	2	13	8	9	9
	Moist forests of Chocó – Darien	3	2	2	2	15	10	8	12
	Mesoamerican dry forests	2	2	2	2	13	12	10	8
	Mangroves of the dry Pacific of Mesoamerica	2	2	2	1	11	10	10	7
	Chihuahua and Tehucan deserts	2	1	1	1	6	3	4	3
	Mesoamerican pine-oak forests	2	2	2	2	11	8	9	8
2	Cockpit Country, North coast forest, Black river Great Morass	2	2	2	2	8	8	8	6
	Mountain range	1	1	1	1	4	4	4	1
	Portland Bight protected area	2	2	2	1	6	8	7	4
	Central Cordillera – Massif North Cordillera – Plaine du Nord Haiti	2	2	3	1	17	16	18	6
	Zapata wetlands	3	2	2	1	15	10	9	3
	Massif de la Selle – Bahoruco and Enriquillo wetlands – Jaragua	3	3	3	2	21	20	20	12
	Macaya Peak	2	2	2	1	17	16	15	6
	Caribbean mangroves	2	2	3	2	19	17	20	13
	Montane forests of the Venezuelan coast and xeric shrublands	2	2	2	1	3	3	2	2

As can be seen, there are 3 sites that obtained, on average, the highest priority according to their importance for the conservation of key ecosystems, important biological corridors, and threatened, endangered, rare and/or endemic species:

- 1 Massif de la Selle – Bahoruco and Enriquillo wetlands – Jaragua
- 2 Moist forests of Chocó-Darien
- 3 Zapata wetlands

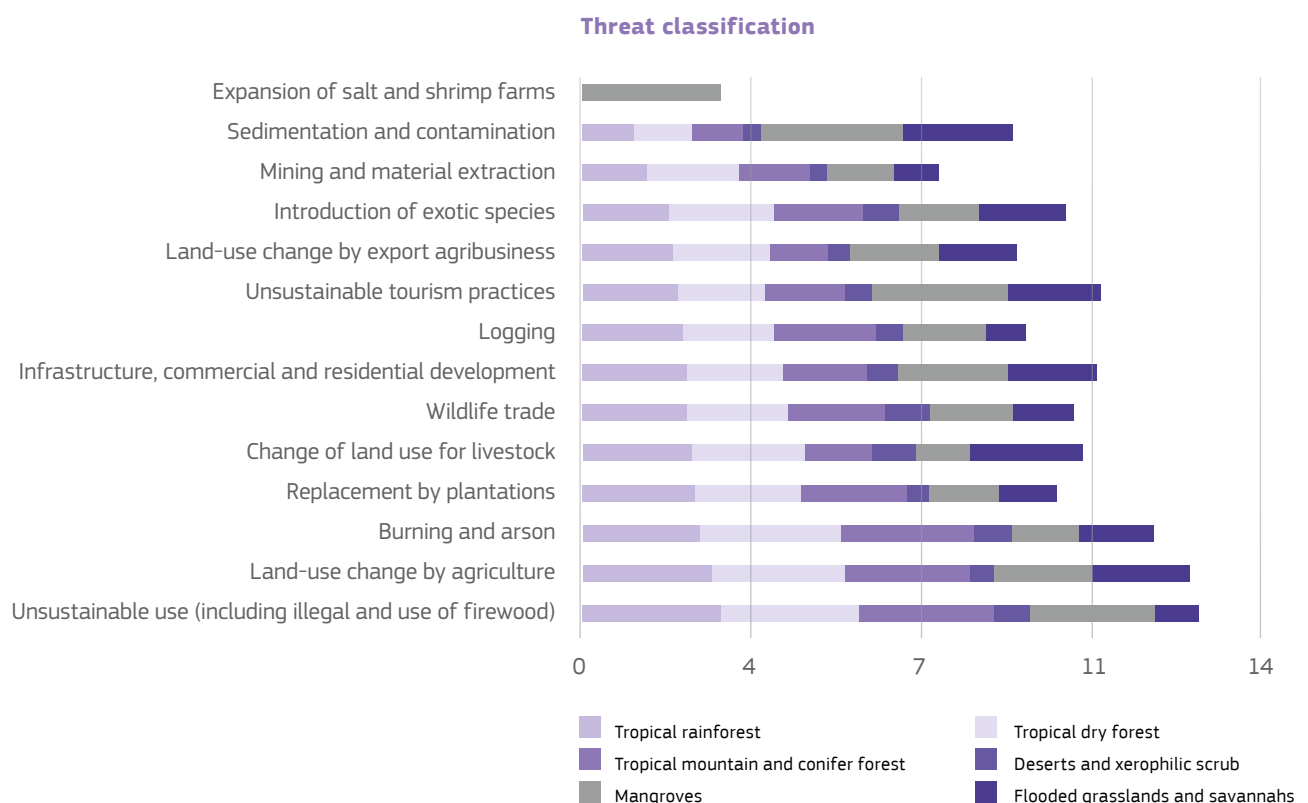
The Massif de la Selle – Bahoruco and Enriquillo wetlands – Jaragua KLC also got the highest average value when considering its relative rate of transformation, i.e. where it is most urgent to focus ecosystem conservation and restoration efforts.

According to their importance in terms of key ecosystem services for a larger number of people, the following sites were categorised as high priority:

- 1 Central mountain range – Northern mountain range (Haiti)
- 2 Massif de la Selle – Bahoruco and Enriquillo wetlands – Jaragua
- 3 Caribbean mangroves

The specialists consulted also worked on the prioritisation of threats to biodiversity in each biome, using a scale of 1 to 3 where 1 is 'low threat', 2 'medium threat' and 3 'high threat'. The results are shown in the figure below.

The threat given the highest value was the unsustainable use of the resources provided by the ecosystems, followed by a change of land use. It is worth noting the importance given to burning and arson, unsustainable tourism practices and the introduction of exotic species. All of the threats are recognised in every site that was reviewed (with the exception of the expansion of salt and shrimp farms, which only occurs in mangroves and other wetlands).





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