The outlook for **oceans, seas** and **marine resources** in Latin America and the Caribbean

Conservation, sustainable development and climate change mitigation

Marcia Tambutti
José Javier Gómez
Editors

UNITED NATIONS
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Contents

Tables

Figures

Maps

Foreword

The year 2020 was meant to be a turning point for oceans. The United Nations had convened the second United Nations Conference to Support the Implementation of Sustainable Development Goal 14 (the Ocean Conference). Unfortunately, the Conference had to be postponed due to the coronavirus disease (COVID-19) pandemic and oceans were thus included in agenda of the Conference of the Parties to the United Nations Framework Convention on Climate Change. This was expected to be the year for achieving several internationally agreed goals, such as four targets of Goal 14 of the 2030 Agenda and the Aichi Biodiversity Targets, most of which have not been achieved. Expectations were also high that 2020 would be the year in which a global ocean treaty would be signed, creating a legal framework for the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. Nevertheless, 2020 has seen great endeavours to disseminate the finest global knowledge on our oceans, which make up two thirds of our planet.

The Economic Commission for Latin America and the Caribbean (ECLAC) launched a regional outlook on SDG 14 implementation in LAC. Specifically, it seeks to identify the main developments, advances, changes in legal and institutional frameworks, including gaps and barriers. It follows the United Nations General Assembly Resolution 73/292 call to support the implementation of the Sustainable Development Goal 14: "Conserve and sustainably use the oceans, seas and marine resources for sustainable development," as well as the results of the High-Level Panel for the Sustainable Economy of the Oceans.

The study has been made possible thanks to the support of the Government of Norway, whose leadership in the sustainable and economic development of the oceans (promoted by Erna Solberg) has assembled an outstanding initiative for ocean action. The High-Level Panel for the Sustainable Oceans Economy has provided extensive up-to-date information, analysis and perspectives essential for change. Norway is an ocean-based society that has shared their vision and knowledge of how oceans can play a key role on present and future global security and human well-being.

Latin America and the Caribbean is a region with great marine heritage. Twenty-three of the 33 LAC nations have more marine than terrestrial territory. Of these, for 18 the maritime area of its economic exclusive zone exceeds 75% of total territory. Recently, ECLAC showed that the region includes 47 of the

258 marine ecoregions[1] around the world, more than any other region. Also, approximately 2.3 million people in LAC are directly or indirectly involved with fishing activities (Chuenpagdee et al., 2019; FAO 2014a). More than 27% of the population live in coastal areas.[2] In the Caribbean the importance of tourism as a fraction of the gross domestic product (GDP) exceeds 60% in Antigua & Barbuda and reaches 20% or more in 10 small island developing States (SIDS). The importance of oceans to livelihoods and food security of Latin America and the Caribbean people must catalyse our action towards blue sustainable development with oceans playing a source of potential solutions and innovation.

Our coasts, seas and oceans have generally been invisible in many critical areas. A significant data gap exists between land and ocean based natural processes and economic impacts. Without up-to-date and robust marine knowledge we enlarge existing barriers to achieving transformative changes vis-à-vis out interaction with the oceans.

In preparation for the launch of the United Nations Decade of Oceans Science for Sustainable Development 2021-2030, ECLAC seeks to provide this study as a tool for regional mechanisms and coordination efforts and offers new ideas as alternative indicators for some targets. It is also aimed to strengthen cooperation in order to reduce gaps and to eliminate barriers to advance in the implementation of SDG 14 and, ultimately, SDG 13. In light of the transboundary nature of the marine environment and interdependencies between the Agenda's targets and goals, the implementation of the ocean SDG will fall short of the transformative ambition of the 2030 Agenda without effective coordination at the regional level.

The region cannot be left behind in meeting the goals of the oceans. Practically all the goals that should have been met by 2020 have not already been achieved and the majority requires greater efforts to be achieved, except DSG 14.5 having at least 10% of marine areas under protection. There are regional aspects that, due to their socio-ecological importance, must be prioritized with urgent policies and adequate monitoring follow-up, such as sustainable fishing with special attention to small scale fisheries, pollution and priority ecosystems as mangroves.

ECLAC will work in coordination with other United Nations agencies and other platforms to assist countries to reorient activities towards sustainable tourism and fishing (especially in artisanal fishing and indigenous peoples and local communities) to reorient economic incentives, diversify markets, avoid and reduce pollution of the seas, strengthen marine protected areas, recover and support technology and low GHG blue bioeconomy, as well as the transfer of knowledge between countries, and of course, strengthen the follow-up of regional multilateral agreements and arrangements that ensure healthy marine ecosystems offshore and within exclusive economic zones, strengthen the capacity of ecosystems to mitigate and adapt to climate change.

[1] According to Spalding et al. 2007. "Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas." BioScience (7)57: 573-583.

[2] Includes only urban coastal areas (<100 km from coast, population centers >100k) https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0718-34022016000200009.

Introduction

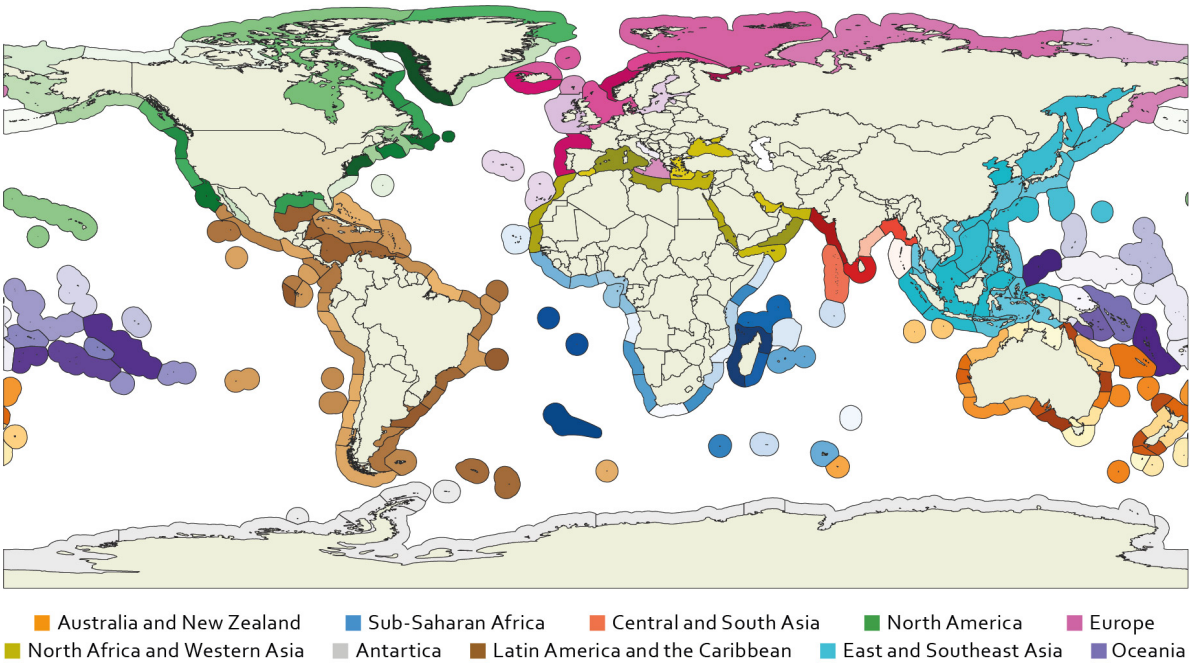
The 2030 Agenda set SDG 14 to conserve and to use oceans, seas, and marine resources sustainably. Over 3 billion people worldwide depend on coastal and marine ecosystems for making a living, recognizing that oceans are home of more than one million known species and acknowledging that oceans are our planet's life support and regulate the global climate system.

For this goal, 10 targets with defined indicators were stablished. After five years, it is important to evaluate their compliance. This document evaluates each of the targets and indicators defined for the SDG 14 in Latin America and the Caribbean (LAC), complementing the analysis with additional data available and innovative ideas for the regional follow-up. A last section describing the linkages between the Climate Change Agenda included in SDG 13 and SDG 14 is explored, making emphasis in the prospects for climate change mitigation that the oceans provide, and its opportunities in the region.

The LAC region is considered one of the most important productive areas of the world, with a unique marine biodiversity, home of the second largest barrier reef of the world. LAC has a uniquely productive marine area and represents a significant portion of global marine biodiversity. As a proxy for a quantitative measure of biodiversity, it has the presence of 47 of the 258 global marine ecoregions —more than any other region (ECLAC 2020 based on Spalding et al., 2007) (map 1 and figure 1). Furthermore, has unique environments such as the Galapagos, underwater trenches of more than 8000m depth practically unexplored, cold water reefs, inter alia.

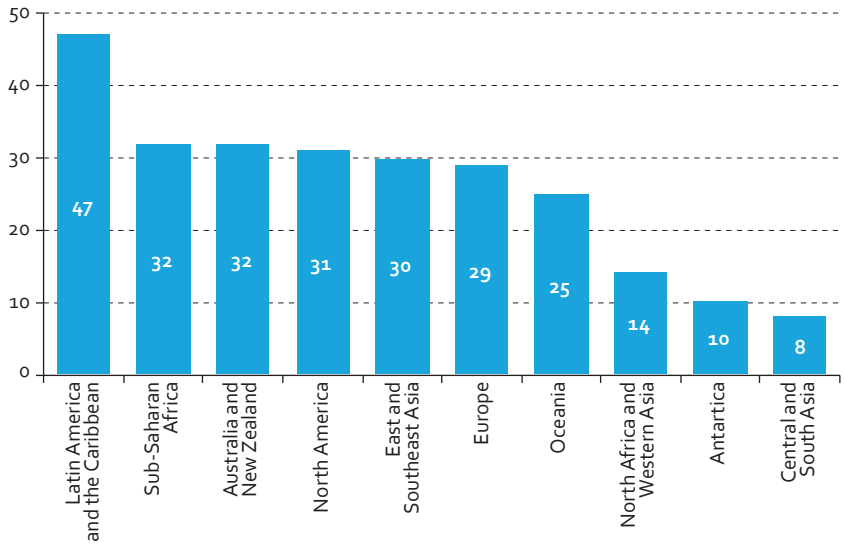
Coastal dwellers and population in coastal areas depend on tourism, commercial, and artisanal fishing, among others. There is potential to sustainably use its resources, with low carbon use and taking advantage of its coastal and marine ecosystems that has not been fully addressed and represented in its institutional development and governance system. Except for the case of coverage of protected areas in relation to marine areas, at which the region has exceeded the target defined by the United Nations, in the rest of the cases the analysis detected a need to accelerate the pace in order to achieve the targets; and even in the case of coverage of protected areas, the need of making effective management is considered to achieve the goal.

Map 1
Number of marine ecoregions present in each geographical region of the world



Source: Prepared by ECLAC based on ecoregions proposed by Spalding et al. (2007), "*Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas.*" BioScience (7)57: 573-583, [online] https://www.worldwildlife.org/biomes; and [online] https://unstats.un.org/unsd/methodology/m49/overview/.

Figure 1
Number of marine ecoregions present in each geographical region of the world



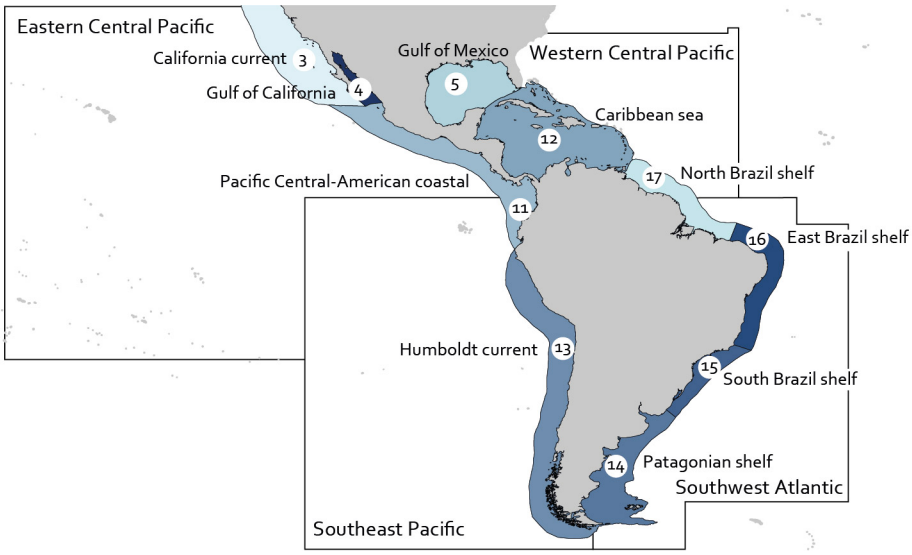
Source: Prepared by the authors based on ecoregions proposed by Spalding et al. (2007), "*Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas.*" BioScience (7)57: 573-583, [online] https://www.worldwildlife.org/biomes; and [online] https://unstats.un.org/unsd/methodology/m49/overview/.

I. Geopolitical configuration used in this study

The LAC region has three major sub-regions, Mesoamerica, Caribbean and South America, with a maritime territory of 16 million square kilometres and more than 70,000 kilometres of coastline, for 22 countries in the region, the sea represents 60% or more of their sovereign territory (World Bank, 2015; UNEP, 2016; ECLAC, 2019).

The region has four major fishing areas defined by the Food and Agriculture Organization (FAO), (FAO-CWP, 2020). Additionally, the LAC region contains 10 of the 66 Large Marine Ecosystems (LMEs) of the world (Large Marine Ecosystems of the World, 2020). Both, fishing areas and large marine ecosystems of the LAC region are shown in Map I.1.

Map I.1
Latin American and Caribbean subregions, clustered fishing areas determined by the Food and Agriculture Organization and the associated 10 Large Marine Ecosystems (LMEs)



Source: Prepared by the authors based on Large Marine Ecosystems of the World (2020) http://www.fao.org/cwp-on-fishery-statistics/background/en/[online] http://lme.edc.uri.edu/index.php/lme-introduction[accessed in April 2020].

A. FAO fishing areas in the LAC region

Fishing areas proposed by FAO enable the analysis for specific SDG 14 targets and indicators related to fisheries sector. Such regionalization analysis is combined with the ten Large Marine Ecosystem (UNEP, 2016; Large Marine Ecosystems of the World, 2020). The proposed regionalization approach incorporates two of the largest semi-enclosed seas and is influenced by the discharge of some of the largest rivers (Amazon, Orinoco, Mississippi). It also includes the Exclusive Economic Zones (EEZs) of 28 nation states and 16 territories belonging to the Netherlands, the United Kingdom of Great Britain and Northern Ireland, France and the United States of America, from these 29 are considered small island developing States (SIDS).

B. Large Marine Ecosystems

LMEs have important features related to ecosystem goods and services, their physical extent and boundaries are based on four linked ecological, rather than political or economic, criteria: (i) bathymetry, (ii) hydrography, (iii) productivity, and (iv) trophic relationships (GEF LME:LEARN, 2017). LMEs in the region are transboundary in nature and interconnected by the marine currents and movement and migration of marine resources. With unique oceanographic features, topography, marine currents, productivity, and interactions. Relatively large areas of ocean space of about 200,000 km^2 or more, adjacent to the continents and extending out to the break in a continental shelf or the seaward extent of a current system (Sherman, 2014). LAC LMEs harbour biodiversity and provide important ecosystem services and tangible benefits, including livelihoods, food security, carbon sequestration and storage, marine transport, and recreational opportunities.

The LMEs approach supports the merger between natural and social sciences in the application of a five module assessment and management strategy to assess and monitor changing conditions in ecosystem: (i) productivity, (ii) fish and fisheries, (iii) pollution and ecosystem health, (iv) socioeconomics and (v) governance (Sherman, 2014; Duda and Sherman, 2002), providing a rallying point for countries to cooperate in dealing with problems relating to the utilization of transboundary marine resources, (Sherman, 2014; Sherman et al., 2017).

II. Target 14.1

By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

Indicator: Index of coastal eutrophication and floating plastic debris density. This indicator has been prioritized by the Statistical Coordination Group for the 2030 Agenda in LAC et al. (https://agenda2030lac.org/estadisticas/indicadores-priorizados-seguimiento-ods.htm).

Marine pollution is a combination of trash and chemicals, most of which comes from land sources and is washed or blown into the ocean. This type of pollution ends damaging coastal and marine species and ecosystems and eventually affecting the way of life of coastal communities and the ocean economy. An adequate way to analyse and tackle the problem of marine pollution is to divide between nutrient pollution, and marine debris.

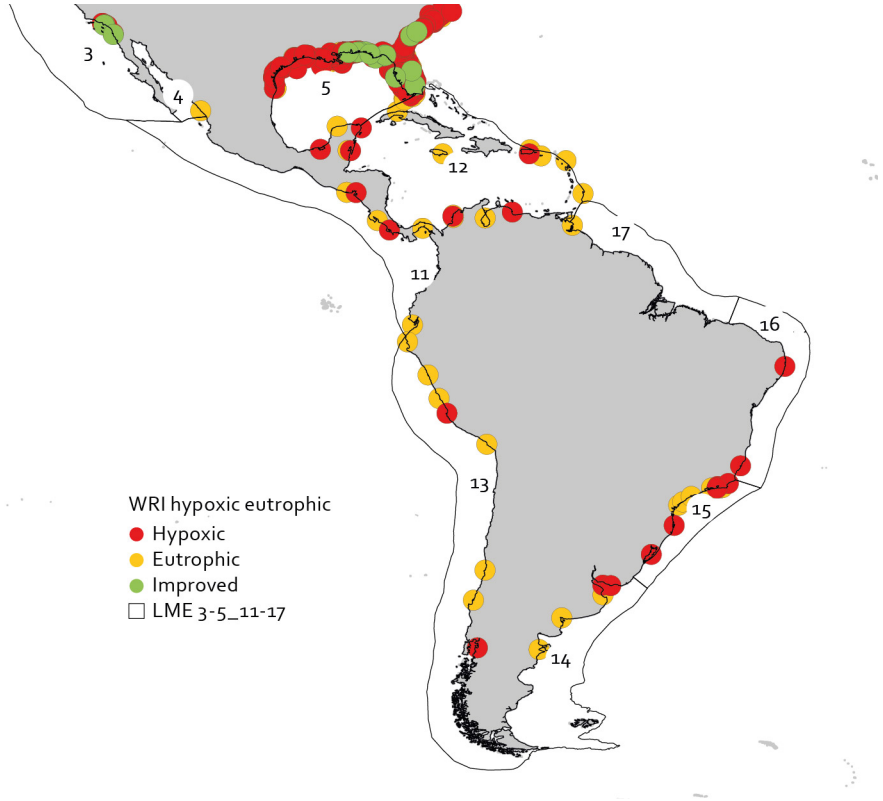
A. Chemical and nutrient pollution

This type of pollution occurs when human activities, notably the use of fertilizer on farms, lead to the runoff of chemicals into waterways that ultimately flow into the ocean. The overload of nutrients such as of nitrogen, phosphorus, and organic matter into marine waters, promote *eutrophication*. These excess of nutrients, often leads to harmful algal blooms which can lead to oxygen depletion. This oxygen depletion process is called *hypoxia*, which ends on fish kills and dead zones. The levels of hypoxia and eutrophication provide us with the best indicators to analyse the effects of chemical and nutrient pollution.

Forty-four hypoxic areas of the world were identified in 1995, by 2007 there were 169 hypoxic areas (Diaz and Rosenberg, 2008). Current global conditions report, at least there are 479 sites identified as experiencing hypoxia. Map II.1 shows there are 19 hypoxic zones and 31 eutrophic areas identified in the LAC region (World Resource Institute, 2020).

As shown in Map II.1, the Gulf of Mexico exhibits the largest hypoxic areas of the region (and actually, of the world), the Northern Gulf of Mexico hypoxic zone was 9 500 km² of area in the early 1990s, by 2008 it had grown to 22 000 km². The latest forecast of the size of the hypoxic zone in the northern Gulf of Mexico for late July 2020 is that it will cover 20,121 km² of the bottom of the continental shelf off Louisiana and Texas (Turner, E. and Rabalais, N., 2020). Many rivers drain into the Gulf, notably the Mississippi in the northern Gulf accounts for about 90% of the freshwater inflow to the Gulf (Padrón López, 2015). Human inputs of nutrients around the Gulf can lead to eutrophication (Rabalais et al., 2010). As a result, problems of environmental degradation such as hypoxia affect the LME across jurisdictional boundaries and cannot effectively be redressed without multinational collaboration (Carlisle, 2014).

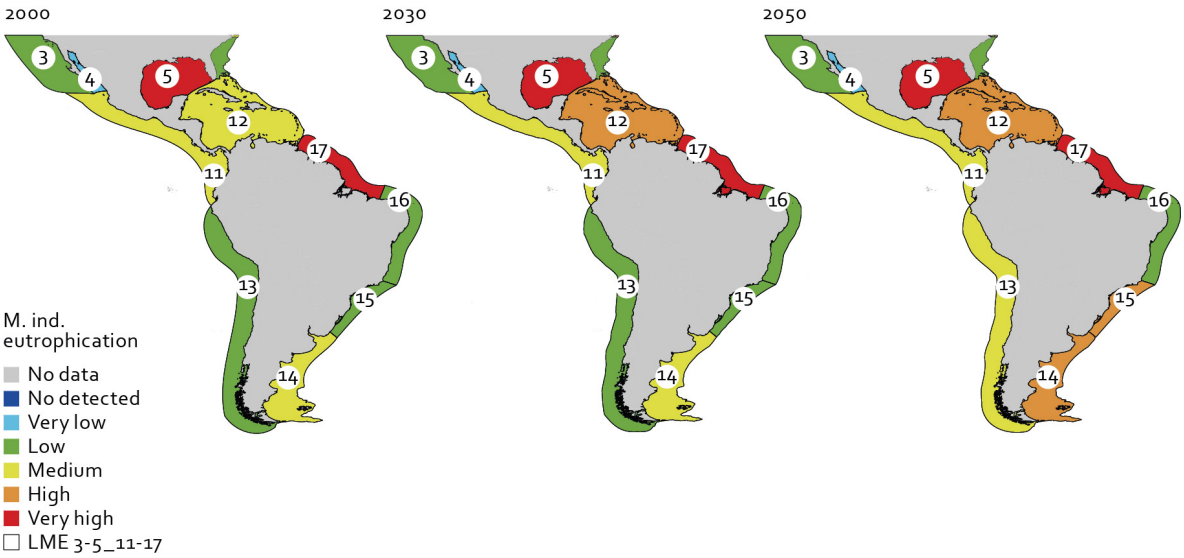
Map II.1
Eutrophication and hypoxic zones in the LAC region



Source: Prepared by the authors on the basis of data from World Resource Institute (2020) Eutrophication & Hypoxia Map Data Set [online database] https://www.wri.org/resource/interactive-map-eutrophication-hypoxia [accessed in July 2020].

The Merged Nutrient Indicator is derived from two basic sub-indicators: Nitrogen Load and Nutrient Ratio (ratio of dissolved Silica to Nitrogen or Phosphorus) these conform the Index of Coastal Eutrophication Potential (ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP, 2016). The regional future scenario exhibits large amounts of nutrients (nitrogen load) entering coastal waters that that are worrisome in four LMEs (map II.2), leading to high and very high hypoxic or anoxic conditions, increased turbidity and changes in community composition, among other effects.

Map II.2
LAC region merged nutrient indicator for 10 LMEs modelled for years 2000, 2030 and 2050



Source: Adapted from ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP (2016) "Water System Information Sheets: Northern America" *Transboundary Waters: A Global Compendium,* Talaue-McManus, L. (ed)., Volume 6-Annex A, B and C, United Nations Environment Programme (UNEP), Nairobi.

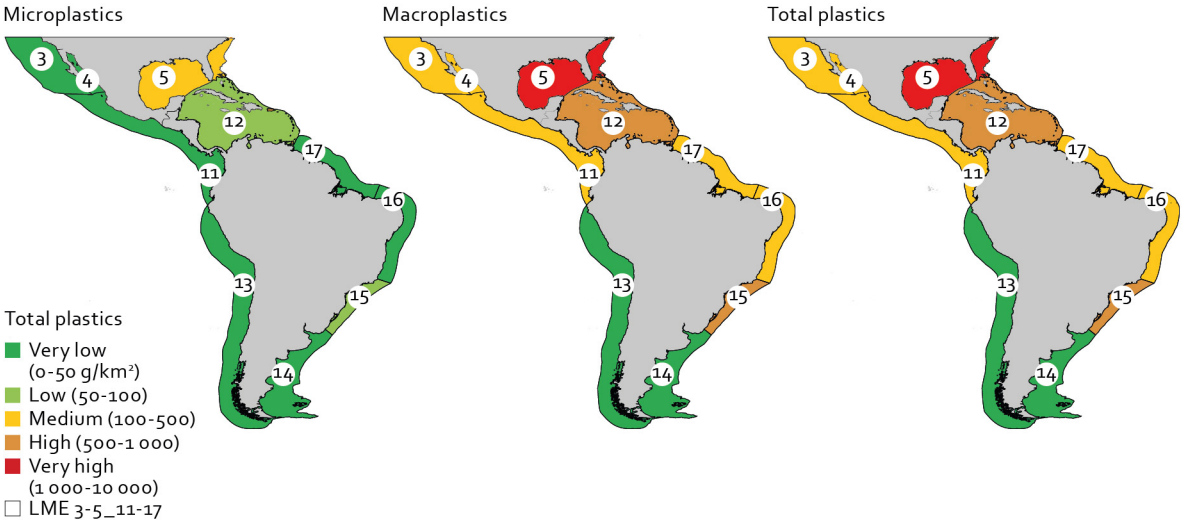
B. Marine debris and plastics

The LAC region has been steadily invaded by plastics from the Atlantic and Pacific oceanic basins. A fraction of that pollution, micro-plastics, has been reported in places as remote as Patagonia in South America (Perez-Venegas et al., 2018), and have reached every marine environment including the deep ocean, deep sea trenches, Artic sea-ice, and the Antarctic Circumpolar Current (Van Cauwenberghe et al., 2013; Obbard et al., 2014; Ivar do Sul et al., 2011). Food chains have also been invaded at different levels (Wright, et al. 2013).

Plastics are the most important pollutant in LAC marine waters. Four main factors contributing to the increasing levels of marine debris have been identified: i) population growth, urban development and tourism growth; ii) high demand of plastic products and production; iii) climate change; and iv) poor governance, lack of regulation and enforcement for land use planning; poor waste management; and marine industries poor management. The LAC region is heavily affected by microplastics since river basins, estuaries and beaches drain to the western tropical and sub-tropical Atlantic (Browne et al., 2011; Becheruccia et al., 2017) and beaches of the Caribbean Sea are also affected (de Scisciolo et al., 2016). Map II.3 shows the wider Caribbean region being impacted by the highest levels of plastics.

Overall risk scenarios condition for the LAC LME region is shown in map II.3. Models estimate a floating plastic abundance of micro, macro-plastic and total plastic distribution in the 10 LMEs of the LAC region (map II.3), differences in the loads are based on three proxy sources of litter: shipping density, coastal population density and the level of urbanization within major watersheds, with enhanced overflow. For the Atlantic region the abundance of floating plastic is 100 times higher than other LMEs in the LAC region, the Patagonian Shelf LME it has been estimated 400 times lower than LMEs with the highest value (ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP, 2016).

Map II.3
Distribution of micro weight density, macro count density and the total weight density of plastics in the LAC region



Source: Adapted from ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP (2016) "Water System Information Sheets: Northern America" *Transboundary Waters: A Global Compendium,* Talaue-McManus, L. (ed)., Volume 6-Annex A, B and C, United Nations Environment Programme (UNEP), Nairobi.

C. Identified relevant actions in the region

In support of the Cartagena Convention, the Caribbean Environmental Programme (CEP) developed a Regional Action Plan on Marine Litter Management (RAPMaLi) for the wider Caribbean region (WCR) (2014), for which the Global Environment Facility has funded two related programmes for the Caribbean and Gulf of Mexico (under implementation). (GEF,2016; GEF, 2018). The 2014 RAPMaLi in the wider Caribbean region was designed to serve as a comprehensive toolkit to assist SIDS in incorporating mechanisms of proper waste management across all sectors (UNEP-CAR, 2014; UN Environment, 2018).

The primary source of data for the occurrence of man-made litter in the near shore and coastal waters of the wider Caribbean region is catalogued annually as part of the International Coastal Clean-up (ICC) Day. During the 7-year period of 2006-2012, marine litter data was documented during the annual ICC in 13 participating countries of the wider Caribbean region. A total of 3,990,120 debris items were removed from the coastal and underwater sites with a total weight of 1,913,166 pounds, covering 2,317 miles by 142,957 volunteers.

III. Target 14.2

By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

Indicator: Proportion of national exclusive economic zones managed using ecosystem-based approaches.

The LAC region has prioritized indicator C-14.2 mangrove area.

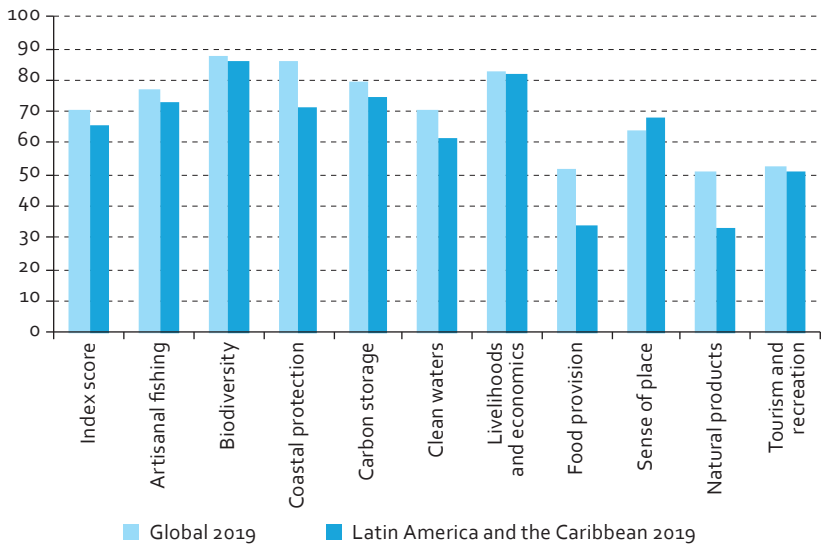
A. Protect and restore ecosystems to achieve healthy and productive oceans

Assessment of actions to achieve healthy and productive oceans in the LAC region include progress on the implementation of actions aim to restore ecosystems, projects to strengthen resilience or proportion of zones managed using ecosystem-based approaches, the former will be described on detail as part of the target 14.5. This report focuses on the ultimate reason of the target, evaluating the health and productivity of the oceans through the Ocean Health Index (OHI) indicator.

The OHI combines biological, physical, economic, and social indicators that are fundamental for healthy oceans. The scores, which range on a scale from 0 to a 100, assess how sustainably people are using marine ecosystem in a region (Ocean Health Index, 2015), being 100 a healthy and productive ecosystem. Figure III.1 shows OHI global and LAC values.

In 2019, LAC region scored generally slightly lower than the global average, except in one element of the index (Sense of Place) which is bigger in LAC. Scores are particularly low in absolute terms, and compared to global averages, in food provision, natural products and tourism and recreation. OHI scores for LAC region have not changed significantly between 2012 and 2015, the first two have the major differences with the global average (UNEP-WCMC, 2016). However, some of the underlying datasets have not been updated since 2012, which may be masking regional changes (Halpern et al., 2015).

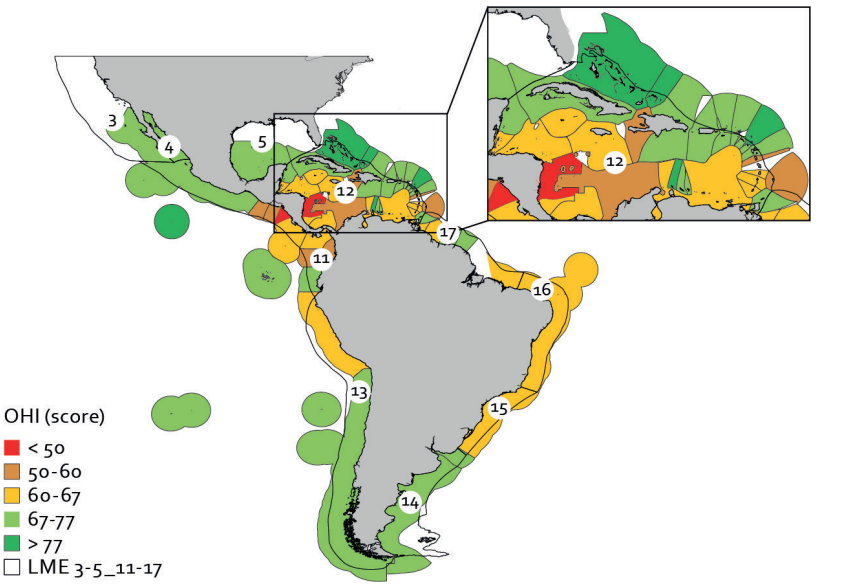
Figure III.1
Global and Latin American and Caribbean Ocean Health Index scores (2019)



Source: Ocean Health Index (2019) "Global scores" [online database] http://ohi-science.nceas.ucsb.edu/plos_change_in_global_ocean_health/ [accessed in November 2020].

Map III.1 shows OHI scores for LAC region. The Pacific region scores are relatively high, above 67-77, except for the area in front of Peru, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama with scores of 50-60 and <50. Central America with 60s and <50s. The Atlantic region scores are 67-77 for the Gulf of Mexico and most of the small island developing States in the Caribbean LME are above average on the OHI compared to other LMEs. Countries in Central America show scores of 50-60 and above 60-67. The Patagonia LME has a relatively high score of 67-77 (http://www.oceanhealthindex.org/region-scores, November, 2020).

Map III.1
Ocean Health Index of Latin American and Caribbean Large Marine Ecosystems (2019)



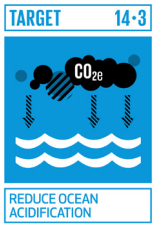
Source: Prepared by the authors based on Ocean Health Index (2020) "Global scores" [online database] http://www.oceanhealthindex.org/region-scores [accessed in November 2020].

For the specific case of LAC, the sustainable management and protection of mangroves was considered as a priority to measure the advance of the target in the region. Mangrove cover in the region has experienced several changes, based on data from FAO (FAO, 2018a) indicate that the LAC region mangroves have declined 20.22 % for the 2001-2018 period[3]. The Atlantic and Pacific coasts of Central America are particular areas of concern, with as many as 40% of the mangrove species present listed on the IUCN Red List as 'threatened with extinction' (Polidoro et al., 2010; Wilson, R. 2017).

The Gulf of Mexico LME is covered by mangroves in 0.36%; the Caribbean LME with 0.35%; the North Brazil Shelf LME has the highest mangrove coverage of any LME, at 10,429 km^2, 0.98% the total area; the East Brazil Shelf LME covered by 0.14% mangroves; and the South Brazil has 0.12% area covered by mangroves. In the Pacific region the Gulf of California LME has 0.52% of mangroves, followed by the Pacific Central America Coastal LME with 0.39%, and the Humboldt Current LME accounts for only 0.0001% are covered by mangroves (ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP, 2016). As seen in table IX.1 there are several GEF funded programmes aim to restore mangrove areas in the Gulf of Mexico and Caribbean LMEs, these actions may be replicated across the entire LAC region.

[3] FAO FRA 2020 presented the recent mangrove stats with an overall 4% recovery for the LAC region. With some remarkable cases like Cuba with (21%), Colombia (71%), Martinique (3%), Mexico (1%) French Guyana (19%).

IV. Target 14.3



By 2030 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels.

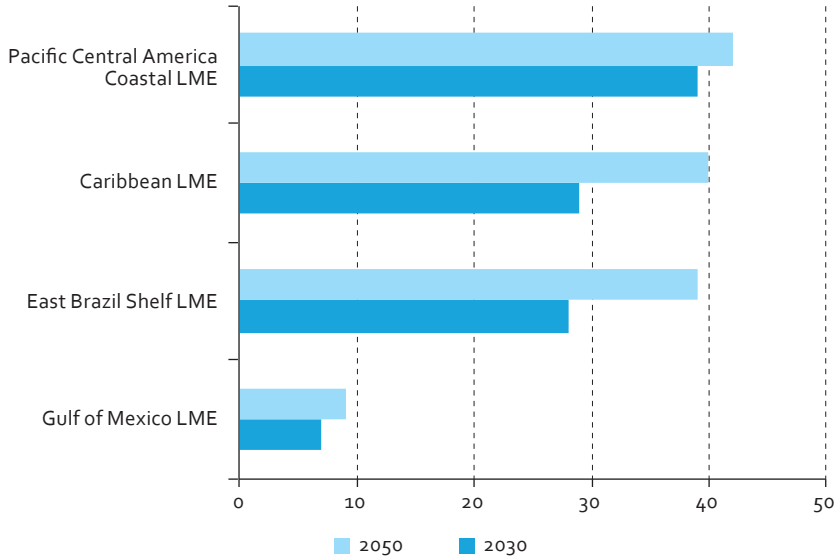
Indicator: average marine acidity (pH) measured at agreed suite of representative sampling stations.

Increasing atmospheric CO_2 concentration is causing increased absorption of CO_2 by the world's oceans, in turn driving a decline in seawater pH and changes in ocean carbonate chemistry that are collectively referred to as ocean acidification. Evidence is accumulating to suggest ocean acidification may directly or indirectly affect many marine organisms and ecosystems. The LAC region has a series of important signs of ocean acidification, particularly in coral reefs.

Data suggest that about one-quarter of the world's reefs are at medium or high threat from acidification during the current decade. By the 2030s, between 65% and 80% of reefs will be threatened by acidification. By the 2050s, the overall percentage of reefs threatened by acidification will have risen to over 80%, with a large percentage of coral reefs at high threat (figure IV.1). Projections from an ensemble of climate models reveal the LAC region is rapidly reaching aragonite limitation, which is a mineral needed for coral reef development.

The LAC region has the second largest barrier reef of the world, the Mesoamerican Barrier Reef (MABR) net eroding due to acidification is 37%, with only 26% accreting with low net calcification rates (Perry et al., 2013; McField, 2017). Other effects, such as reshaping of ecosystems and disruption of natural food webs (specially with introduction of exotic invasive species) and coral diseases may also prove important. Ocean acidification could cause tropical coralline algae to stop growing by 2040 and subsequently to start to dissolve (Doney et al., 2009). Even healthy Caribbean reefs have minimal net growth, due to the relatively slow growth rates of most corals and the constant forces of chemical and biophysical erosion.

Figure IV.1
Projections of coral reef risk for years 2030 and 2050 due to ocean acidification
(Percentages)



Source: Adapted from ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP (2016) "Water System Information Sheets: Northern America" *Transboundary Waters: A Global Compendium,* Talaue-McManus, L. (ed)., Volume 6-Annex A, B and C, United Nations Environment Programme (UNEP), Nairobi.

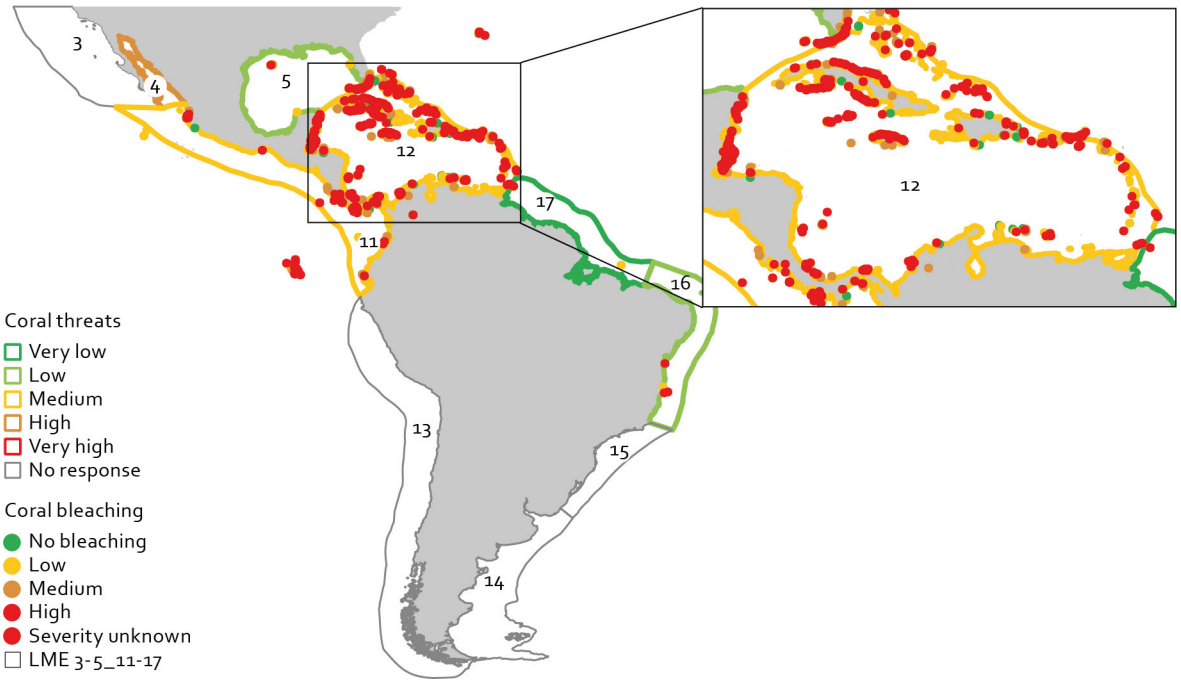
Today, the lowest surface pH values in the world are found in the Eastern Tropical Pacific that covers the Pacific Ocean side of Mexico, Central America up to the coastal areas of Ecuador (Fiedler and Lavin, 2017). Ocean acidification in the Northeast Tropical Pacific LMEs also represent a reason for concern, as projections reveal this is one of the regions more rapidly reaching aragonite limitation for coral reef development under future scenarios. Another major threat is projected to occur in the Pacific Central America Coastal region, as the reefs are already at the environmental limits for development. The potential detrimental consequences of ocean acidification in the LAC region for marine life and dependent human communities are more acute in the Caribbean SIDS due to the impacts on coral reefs (Melendez and Salisbury, 2017).

The IPCC report on regional climate change (IGBP, IOC and SCOR, 2013; Gledhill et al., 2008); found that the Caribbean region had experienced a sustained decrease in aragonite saturation state from 1996 to 2006, additionally about 60% of coral reefs are surrounded by waters that have less than adequate aragonite saturation states, if carbon dioxide concentrations increase to 450 ppm, more than 90% of coral reefs will be surrounded by such waters (Oceana, n.d.). Other models indicate that surface ocean pH expected change is reflected in a decrease of pH of the order of 0.1 for the 2006-2055 period versus the previous five decades. The variance of the pH in the modelled future appears to decrease by as much as 50% in this period (Melendez and Salisbury, 2017).

Coral reefs within LMEs have been assessed (ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP, 2016) using the Global Distribution of Coral Reefs 2010 and the Reefs at Risk Revisited data sets, using an integrated threat score that incorporates local and a global threats including warming sea temperatures and ocean acidification projected to 2030 and 2050. As shown in map IV.1 several LAC LMEs were found to have reefs facing high levels of integrated local threats (ILEC, UNEP-DHI, UNESCO-IHP, UNESCO-IOC and UNEP, 2016). The percentage coral cover estimated as facing 'high' or 'highest' risk from integrated threats increases substantially if past thermal stress is included.

Remote monitoring of coral reefs is critical for early detection, on-the-ground response, communication, and future resilience planning to better protect these ecosystems from further degradation and loss. Map IV.1 shows a map of coral bleaching categories in the LAC region, based on NOAA Coral Reef Watch programme data for years 1963-2018. This can be used to develop models, observe, predict, and report to users on the coral reef environment physical environmental changes.

Map IV.1
Coral reef bleaching in Latin America and Caribbean region accordingly to NOAA categories (1963-2018) and local coral threats status according to UNEP (2016)



Source: Prepared by the authors based on NOAA (2020) "NOAA Coral Reef Watch (CRW) Products List" [online database] https://coralreefwatch.noaa.gov/satellite/product_overview.php [accessed in November 2020]; IOC-UNESCO and UNEP (2016) Large Marine Ecosystems: Status and Trends, Summary for Policy Makers, United Nations Environment Programme (UNEP), Nairobi.

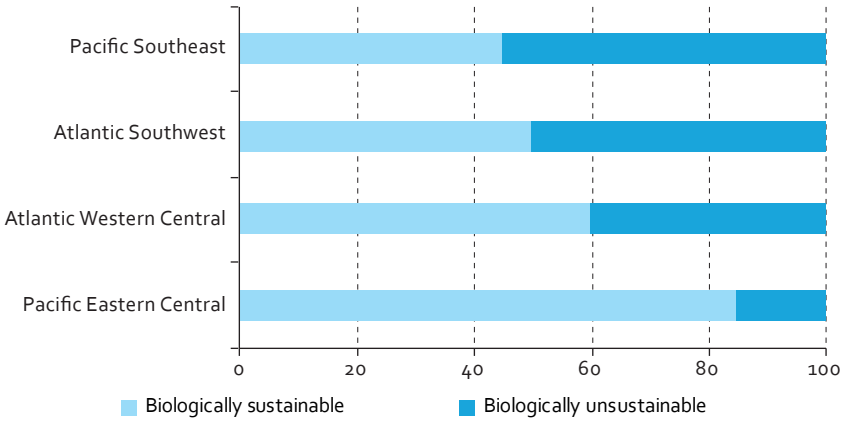
V. Target 14.4

By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristic.

Indicator: Proportion of fish stocks within biologically sustainable levels, also prioritized by the regional approach.

According to United Nations the sustainability of global fishery resources continues to decline. Globally, in 1974, 90% of the fish stocks were within biologically sustainable levels and by 2017 only 65.8% remained at sustainable levels (United Nations, 2020). In the case of LAC the situation is similar. For 2017, the Atlantic Southwest and Pacific Southeast reported less than 50% of the evaluated stocks on sustainable levels, while the Atlantic Western Central and Pacific Eastern Central presented around 80% of the stocks at sustainable levels as seen in figure V.1.

Figure V.1
Sustainability of fish stocks in Latin America and the Caribbean



Source: Prepared by the authors based on FAO (2020a) The State of World Fisheries and Aquaculture 2020, Sustainability in action, Rome, FAO [online] https://doi.org/10.4060/ca9229en [accessed in November 2020].

Taking from 20 to 50% of the fish stocks to unsustainable levels had not represented an increase of production in the region. Comparing the production of the 1980s with the current production, catches had reduced in 23% (table V.1).

Table V.1
Annual wild fisheries production by subregion

Subregion	Average annual production (*million tons*)				Variation
	1980s	1990s	2000s	2010s	1980s-2010s
Atlantic Western Central	2.01	1.83	1.55	1.47	-26.87
Atlantic Southwest	1.78	2.25	2.15	1.91	7.30
Pacific Eastern Central	1.62	1.44	1.81	1.7	4.94
Pacific Southeast	10.23	14.9	13.1	7.87	-23.07
Total	**15.64**	**20.42**	**18.61**	**12.95**	**-17.20**

Source: Prepared by the authors based on FAO (2020a) The State of World Fisheries and Aquaculture 2020, Sustainability in action, Rome, FAO [online] https://doi.org/10.4060/ca9229en [accessed in November, 2020].

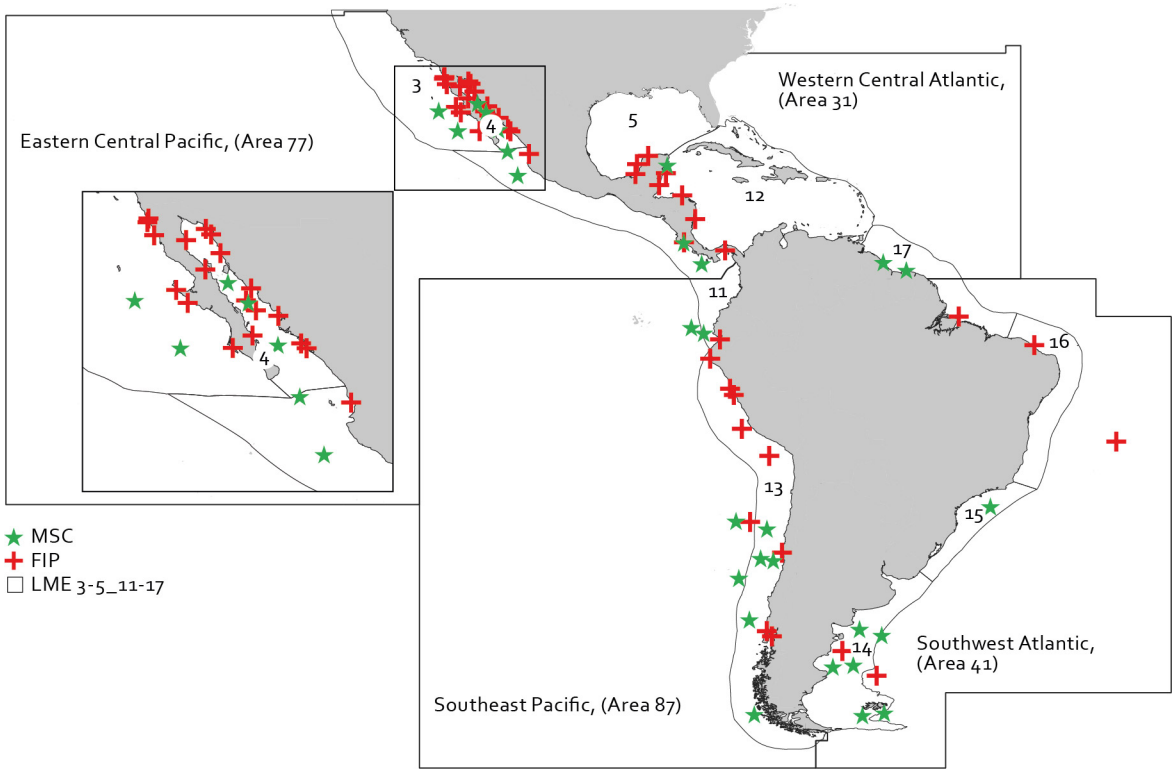
Losing stocks without increasing the total catches sounds counterintuitive; and poor fisheries management could explain this situation. According to the World Bank, every year the world loses about 83 billion dollars compared with the optimal global maximum economic yield equilibrium (World Bank and FAO, 2009; World Bank, 2017). Of this global loss, driven by inefficiencies, Latin America accounts for 7%. In addition, climate change will have additional negative impacts on global marine fisheries, which will require more urgency for taking actions to restore fisheries and improve management and governance.

Adequate fisheries management requires a science-based management plan to effectively regulate harvesting. In 1995, FAO members adopted the Code of Conduct for Responsible Fisheries. For the LAC region, the number of management plans per year has remained constant, an expression of the lack of perceived urgency to address this issue by countries in the region (FAO, 2020a). Only Europe and Southwest Pacific showed an increase in management plans in this period 2011-2018.

However, having official management plans is not the only way to transition to well-managed fisheries. In the LAC region there are good examples of fisheries that are certified by the Marine Stewardship Council (MSC), which establishes global voluntary standards to evaluate fisheries based on indicators organized into three groups: stock status of the target fishery, impacts on ecosystems and species and management. In addition, the region also provides good examples of fisheries transitioning to sustainability under the voluntary Fishery Improvement Projects (FIP) scheme. Map V.1 shows nearly 80 MSC certified fisheries or FIPs evaluated according to fishery progress.

This means 80 communities or industries had decided, sometimes motivated by market incentives, to voluntarily go beyond regulations and move towards sustainability. It is worth mentioning the case of the Gulf of California, with almost one-third of all cases in a relatively small fraction of the region. These cases show that even at the country level there seems to be weak progress in the region, at industry and community level there are stories that provide some hope for the region.

Map V.1
Voluntary schemes for transitioning towards sustainable fisheries in Latin America and the Caribbean



Sources: Prepared by the authors based on: (a) Marine Stewardship Council - Track a Fishery (2020) [online database] https://fisheries.msc.org/en/fisheries/ [accessed in October 2020] and (b) Fishery Improvement Project, Progress Tracking Database and Tool (2020) [online database] https://fisheryprogress.org/directory [accessed in October 2020].

VI. Target 14.5

By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

Indicator: Coverage of protected areas in relation to marine zones, also prioritized regionally.

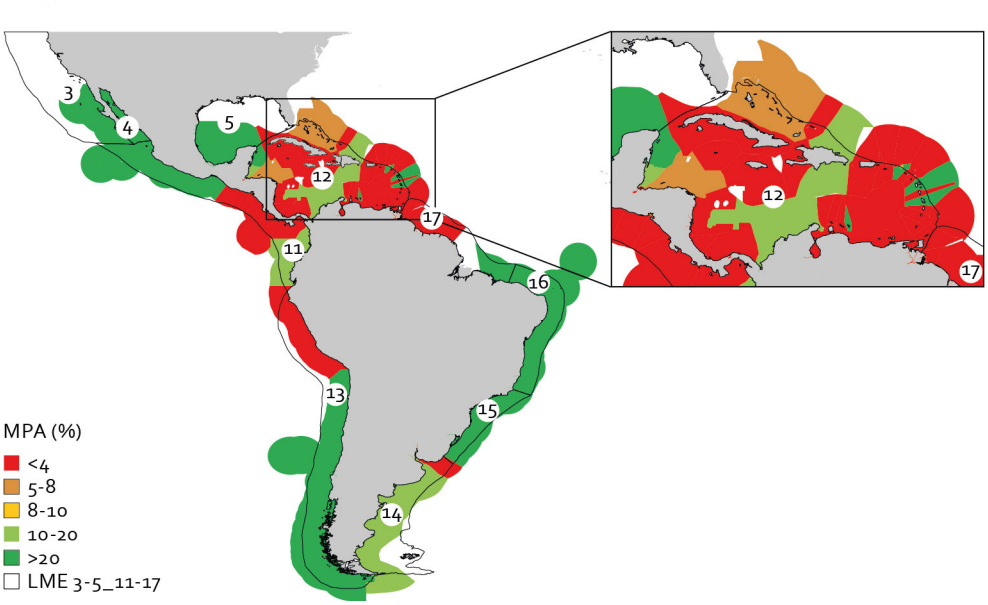
The LAC region has additionally prioritized indicator C-14.5 Proportion of MPAs compared to total marine area.

According to Protected Planet database (UNEP-WCMC and IUCN, 2020 accessed on December 15, 2020), there are 17,495 MPA in the world, which represent 7.66% of the total surface of the world's oceans. The LAC region has a total marine area of 18,723,205 square kilometers, with over 3.8 million square kilometres of MPAs (including MPAs beyond the EEZ) representing 20% of the marine surface of the region, well above the SDG 14.5 target, but not evenly, as shown in Map VI.1.

The target in LAC region has been fulfilled, however, there are over 20 countries that are still far away to achieve it, while others like Martinique, Bonaire, Guadeloupe, and Saint Martin are dedicating over 95% of their Economic Exclusive Zone (EEZ) as MPA. Large oceanic MPAs in Mexico, Ecuador, Chile, and Brazil contribute significantly to the regional scale indicator. However, there is a clear need to provide sufficient financial funds to properly carry out their management plans, surveillance, and field work.

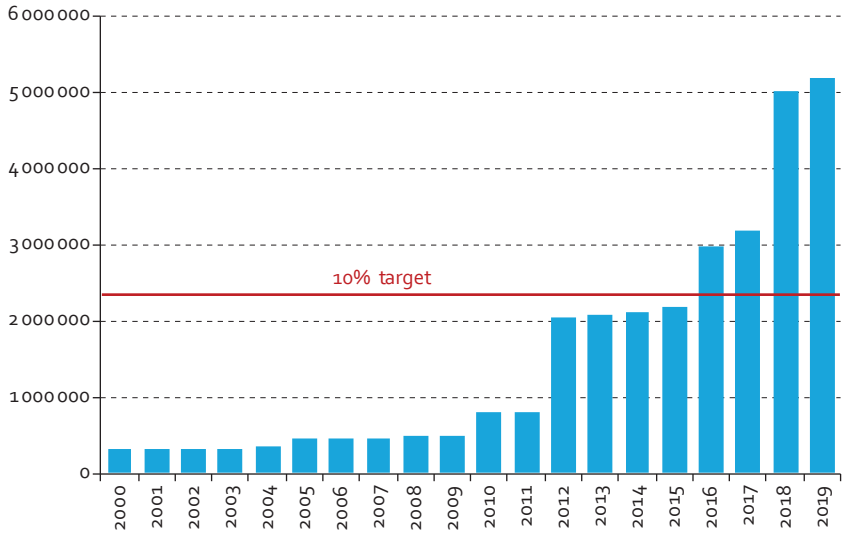
Figure VI.1 shows the regional evolution on declaration on MPAs in the region during the last 10 years. Considering the 31 countries of the LAC region there are a total of 9,962 MPAs, 1,282 under management effectiveness evaluations (UNEP-WCMC, 2020). MPA coverage in LAC is heterogeneous, taking territorial seas and Economic Exclusion Zones together, the region has protected 17.51% of the total area. Although MPA coverage represent a huge advance in the designation of new areas under official decree, above the 10% established in this SDG 14.5 target and the Aichi target 11, such gain is at risk, because only 1.79% of them have management plans (www.protectedplanet.net, [accessed in December 15, 2020]). The lack of sufficient funds and the recent financial cuts documented put at risk the gain in coverage. In addition, good governance, sound planning and design and effective management that need to be addressed to ensure their functionality and its contribution to human well-being as IUCN has propose in the Green List Standards for Protected and Conserved Areas (IUCN, n.d.).

Map VI.1
Coverage of marine protected areas in relation to marine areas, by country
(Percentages)



Source: Prepared by the authors based on UNEP-WCMC and IUCN (2020) "Marine Protected Areas" *The World Database on Protected Areas (WDPA)/The Global Database on Protected Areas Management Effectiveness (GD-PAME)* [online database] www.protectedplanet.net [accessed in November 2020].

Figure VI.1
Total surface of marine protected areas in Latin America and the Caribbean (2000-2019)
(Square kilometres)



Source: Prepared by the authors based on United Nations Global SDG Database, UNEP-WCMC and IUCN (2020) "Marine Protected Areas" *The World Database on Protected Areas* (WDPA) [online database] www.protectedplanet.net December 2018, and country data from ECLAC (2020) "CEPALSTAT" [online database] https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=3961&idioma=e [accessed in November 2020].

Since 2012 the area covered by MPAs has grown steadily complying with the 14.5 target in 2016. However, MPAs do not cover all types of marine ecosystems, so the effort to protect a representative part of them must be sustained. MPAs with strong protection under 30-40% of their key marine habitats will conserve and enhance biodiversity, increasing abundance of marine life, improving resilience of marine ecosystems. This well enforced MPAs extend its benefits to the fisheries sector, coastal protection by improving their resilience against climate change processes. It is worth to mention that adding 10% of protection in the coming years would help to overcome the current slow progress. Protection targets for biodiversity should aim to represent a full range of marine ecosystems and species to ensure the reduction of marine ecosystem impacts (Rogers, Aburto-Oropeza et al. 2020).

An iconic example of MPA success in LAC region is the absolute increase in fish biomass at Cabo Pulmo National Park in the Gulf of California (CPNP), a well- documented recovery of this MPA that attracts thousands of divers and generates millions of dollars for the surrounding community each year. Marine-protected areas and marine conservation provide a clear pathway to integrate biodiversity conservation and fisheries management with the potential for strong support by fishers and other stakeholders (Erisman et al., 2017).

VII. Target 14.6

By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.

Indicator: Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported, and unregulated fishing.

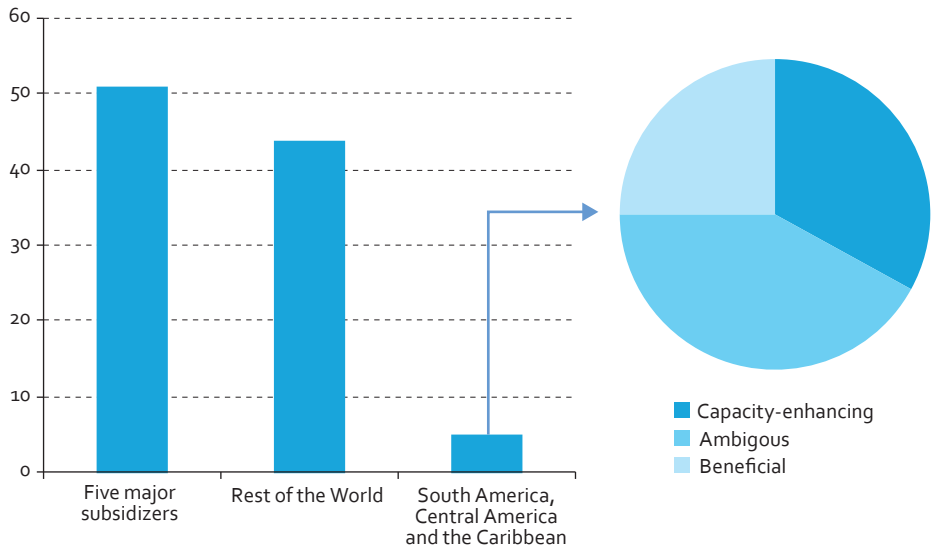
A. End of subsidies contributing to overfishing

According to WTO, a subsidy is a "financial contribution" by a government or any public body which confers "benefit" to the private sector via transfers of funds. Subsidies could be classified as: (1) beneficial subsidies, investments in the promotion of fishery resource conservation and management; (2) capacity-enhancing subsidies include programmes that currently, or have the potential to, encourage fishing capacity to develop to a point where resource exploitation exceeds the maximum sustainable yield (MSY), effectively resulting in the overexploitation of natural capital assets; and (3) ambiguous subsidies have the potential to lead to either sustainable management or overexploitation of the fishery resource (Sumaila et al., 2019).

Recent estimations indicate that by 2018 public entities provided 35.4 billion dollars in form of subsidies (Sumaila et al., 2019). Capacity-enhancing subsidies constituted the highest category provided, at over USD 22.2 billion; being fuel subsidies (including fuel specific tax exemptions) the largest subsidy type at 22% of the total global subsidy. One half of all fishing subsidies worldwide are provided by only four nations: China (21%), European Union (11%), United States of America (10%), Republic of Korea (9%); while all countries in the South, Central and Caribbean Region represent only the 5.6% of the total subsidies in the word. One third of the subsidies of the region are capacity enhancing, one fourth could be considered as beneficial and the rest are ambiguous as shown in figure VII.1. Considering the small portion of subsidies given by LAC region, a global elimination of all subsidies will represent a gain in competitiveness for the region.

WTO negotiations on fisheries subsidies were launched in 2001 at the Doha Ministerial Conference, with a mandate to "clarify and improve" existing WTO disciplines on fisheries subsidies. After WTO Ministerial Conference 11, the discussion began to move forward on four different topics: (1) eliminating subsidies that contribute to IUU, (2) eliminating subsidies for fisheries targeting overfished stocks, (3) eliminating subsidies that generate overfishing and overcapacity, and (4) establishing the rules for the application of the new disciplines for fishing subsidies and solution of controversies. WTO announced in September 2020 the possibility of an agreement before the next ministerial conference, to be confirmed by summer 2021.

Figure VII.1
Subsidies in the world, the five major subsidizer countries and in Latin America and the Caribbean
(Percentages)



Source: Prepared by the authors based on Sumaila, R. et al. (2019) Updated estimates and analysis of global fisheries subsidies. Marine Policy. [online] 109. 10.1016/j.marpol.2019.103695.

B. Redirection of fishery subsidies

Elimination of harmful subsidies represents an opportunity to redirect funding and investment on sustainable fisheries. For example, in 2018 in Mexico 80% of the fishing subsidies were received by just 25% of the beneficiaries, and small scale fisheries received only 30% of the total amount of subsidies (Cota Leal y Rolón Sánchez, 2018); at regional level the situation is similar where industrial fleet receive 68% of the total amount of subsidies, while small scale fleet receives only 32% (Schuhbauer et al., 2017). An elimination of this type of subsidies to other kind of support could turn into a fair assignation of the public funds. Cisneros et al. (2016) analysed four options for the redirection of fishing subsidies: (1) buy-backs of vessels, to reduce fishing effort, (2) decoupling subsidies, (3) conditioning subsidies to creating rules for sustainability and (4) reorienting subsidies. Finding that buybacks present the highest probability to fail, decoupling results in ambiguous results, while conditioning and reorienting presented the better outcomes in terms of moving from "bad" subsidies to beneficial ones.

C. End illegal, unreported, and unregulated fishing (IUU)

IUU fishing undermine efforts to manage fisheries sustainably and conserve marine biodiversity. IUU fishing is a broad term which includes: (1) fishing and fishing-related activities conducted in contravention of national, regional, and international laws; (2) non-reporting, misreporting, or under- reporting of information on fishing operations and their catches; (3) fishing by "Stateless" vessels; (4) fishing in convention areas of Regional Fisheries Management Organizations (RFMOs) by non-party vessels; and (5) fishing activities which are not regulated by States and cannot be easily monitored (Agnew et al., 2009).

IUU fishing captures are estimated from 10 to 26 million tons a year, valued at approximately between 10 to 23 billion USD, with an economic value that represents 15% of the world's recorded production, additionally, in terms of its market value, IUU ranks between 7 to 16% of the total seafood export of the 148 billion USD recorded in 2014 (Widjaja et al., 2020). To tackle IUU it is important to understand the elements that are driving to IUU worldwide. According to Widjaja et al. (2020) the drivers of IUU can be classified in three categories: governance, economic incentives, and enforcement (table VII.1).

Table VII.1
Main drivers associated with Illegal, Unreported and Unregulated Fishing and possible solutions

Driver	Situation	Solutions
Weak governance	IUU is propelled by governance gaps: lack of participation in existing multilateral instruments; inadequate implementation of existing instruments; inadequate flag state control over vessels; and subsidies and other perverse signals.	Adopt the Port State Measures Agreement, close registry to flag of convenience vessels, create strong deterrents (port controls, sanctions, transparency, at-sea patrols and multilateral agreements), improve transboundary case handling, and enhance transparency in fisheries.
Economic Incentives	IUU is a high-reward, low-risk activity. There are too many highly lucrative opportunities where fishers' expected benefits from breaching regulations. Overcapitalization also incentivize IUU.	Transparent supply chains, smart new tracking technologies, consequences for bad behaviour, and eliminate subsides that create overcapacity.
Barriers to enforcement	Lack of political will, coupled with the logistical difficulties in monitoring and reaching vast areas of the ocean, often results in weak enforcement.	Build capacity and support establishing regional information, to have sharing and cooperation mechanisms, monitor transhipments, and improve monitoring of the fishing fleet.

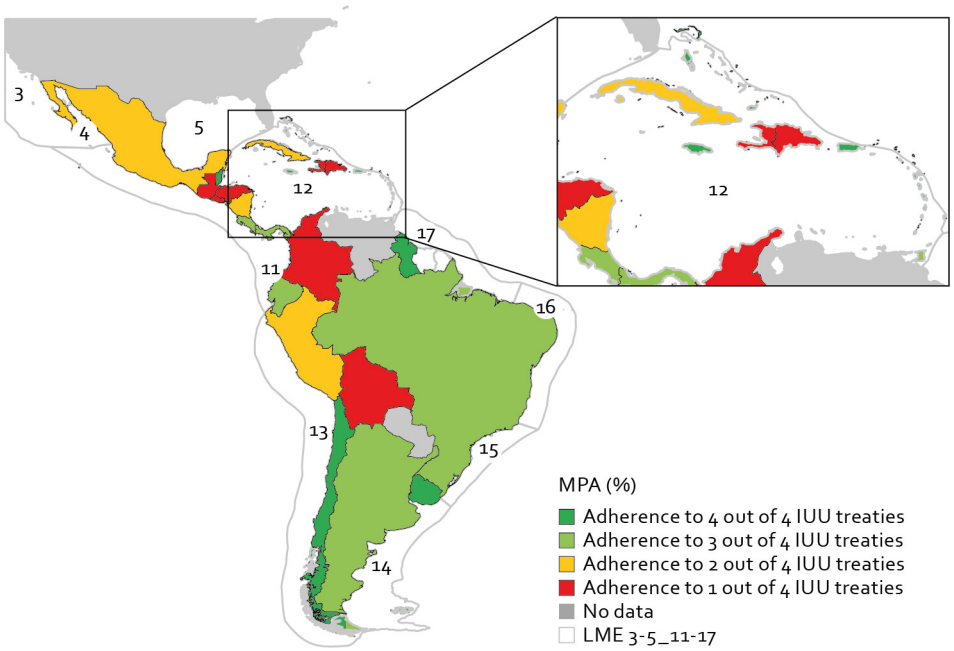
Source: Prepared by the authors based on Widjaja, S. et al. (2020) Illegal, Unreported and Unregulated Fishing and Associated Drivers. Washington, DC, World Resources Institute. [online] www.oceanpanel.org/iuu-fishing-and-associated-drivers [accessed in November 2020].

To combat the global problem of IUU, FAO has developed an international framework, a suite of tools, and four key international treaties, to combat illegal fisheries in a coordinated manner. Map VII.1 shows the progress in LAC region on the adherence and ratification of these treaties.

The role of the RFMOs is key in a global fisheries governance context. Considering the international agreements on sustainable fishing and commitments to oversight fishing activities and vessels to prevent IUU fishing, RMFOs are the primary cooperation mechanism between fishing countries and coastal states (Hutniczak et al., 2019). However, some RFMOs still do not make public their lists of authorized vessels, making it difficult to check them against lists of IUU fishing vessels, and only few RFMOs have implemented catch documentation schemes to certify legal catches in a standardized way.

In 2018, FAO supported the creation of the Network for the Exchange of Information and Shared Experiences between LAC countries to prevent, deter and eliminate IUU fishing. The network was launched with the active participation of Chile, Colombia, Costa Rica, Ecuador, Panama, Peru, Dominican Republic, Guatemala, Mexico, Uruguay (FAO, 2020d).

Map VII.1
Adherence of LAC countries to the international framework for addressing IUU



Source: Prepared by the authors based on United Nations Treaty Collection (2020a) Adherence and Implementation of the United Nations Convention the Law of the Sea (UNCLOS); (2020b) Adherence to the United Nations Fish Stock Agreement; (2020c) Adherence and implementation of the PSMA; and (2020d) The Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas (The Compliance Agreement) [online] https://treaties.un.org/Pages/Index.aspx?clang=_en [accessed in October 2020].

VIII. Target 14.7

By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture, and tourism.

Indicator: Sustainable fisheries as a percentage of GDP in small island developing States, least developed countries, and all countries.

A. Small Island Developing States

There are 52 countries and territories classified as Small Island Developing States (SIDS) by the United Nations, 38 are United Nations members and 14 are non-United Nations members or associate members of the Regional Commissions (UN-OHRLLS, 2011). In the case of Latin American and Caribbean there are 16 SIDS that are United Nations members and other 9 non-member countries (table VIII.1).

Table VIII.1
Latin American and Caribbean SIDS by United Nations membership

United Nations Member SIDS		Non-Member SIDS
Antigua and Barbuda	Guyana	Bermuda
Bahamas	Haiti	Cayman Islands
Barbados	Jamaica	Curacao
Belize	Saint Kitts and Nevis	Guadeloupe
Cuba	Saint Lucia	Martinique
Dominica	Saint Vincent and the Grenadines	Montserrat
Dominican Republic	Suriname	Saint Martin
Grenada	Trinidad and Tobago	Turks and Caicos Islands
		United States Virgin Islands

Source: UN-OHRLLS (2011). Small Island Developing States: Small Islands Big(ger) Stakes. Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, New York, UN-OHRLLS.

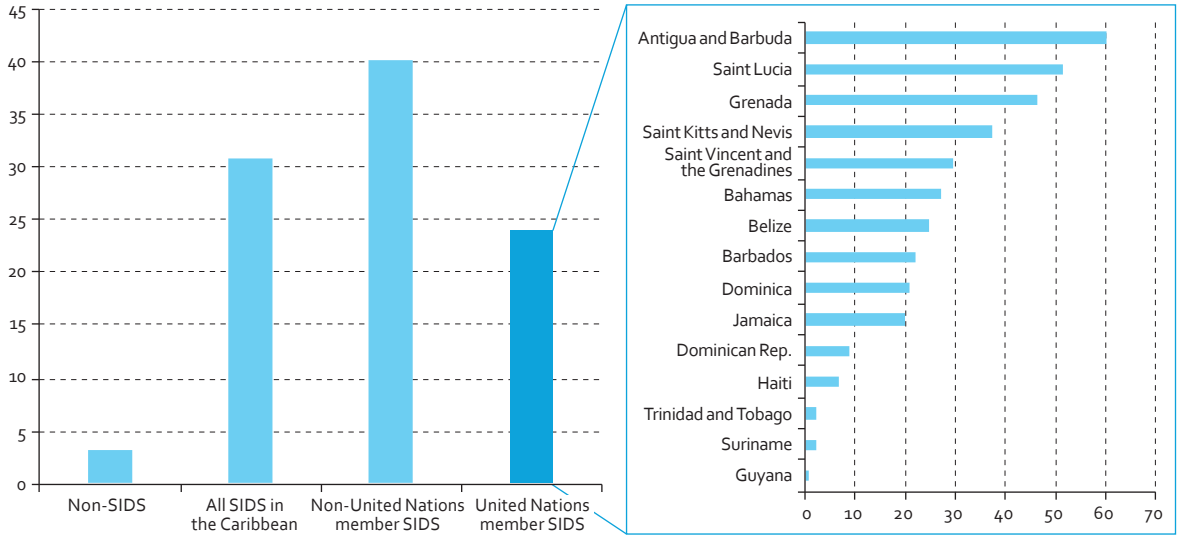
The importance of coastal activities such as tourism and fisheries are vital for the economies, food security and prosperity of the SIDS, for which providing tools for the sustainability and resilience of these economic activities is indispensable for the prosperity of SIDS coastal communities.

B. Importance of tourism

Tourism has been the main catalyst of the economy in the SIDS. In the Caribbean, tourism depends on healthy environment to attract visitors looking for clear waters and vibrant reefs; however, if this activity is not properly planned and managed, tourism could significantly degrade the environment on which it depends. The international community, local decision makers, industry and tourists should recognize the value of tourism for SIDS and the fragility of the resources on which it depends, thus ensuring that tourism development and environmental management are mutually supportive (UN-OHRLLS, 2011).

Figure VIII.1 shows the importance of tourism as a fraction of the GDP. For insular states, tourism represent a higher proportion of the GDP than for the rest of the region. More than 30% of the GDP of these countries is generated by tourism and in some cases as Turks and Caicos or Saint Martin, tourism represents 77% and 63% respectively.

Figure VIII.1
Income generated by tourism in proportion to GDP
(Percentages)



Source: Prepared by the authors based on UNWTO (n.d.) "Tourism Statistics" [online database] https://www.e-unwto.org/toc/unwtotfb/current [accessed in November 2020].
Note: (a) values do not represent regional average but the linear mean of the national values in the different regions and aggregation levels; (b) only six of the nine non-member States reported this data; (c) of the member States, Cuba was the only one not reporting.

Considering the importance of tourism for SIDS the United Nations World Tourism Organization (UNWTO) is leading four initiatives: (1) the United Nations Steering Committee on Tourism for Development (SCTD) aim to gather experience and expertise of its members to create synergies, coordination and technical assistance in a coordinated fashion to enhance national competitiveness; (2) the Global Partnership for Sustainable Tourism which is a global initiative to promote sustainability in the mainstream of tourism policies, development, and operations; (3) the joint work with the World Travel and Tourism Council (WTTC) to promote tourism as a main driver of economic development and sustainability; and (4) sustainable

tourism programme within the 10 Year Framework of Programmes on Sustainable Consumption and Production Patterns of the United Nations (UNWTO, n.d.).

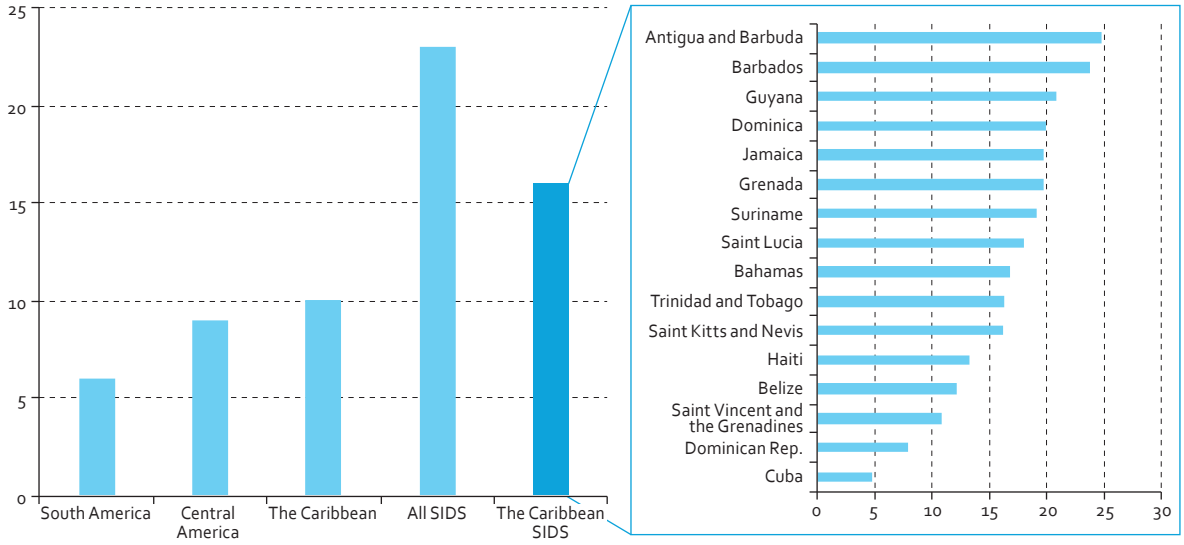
The recognition of UNWTO of the importance of sustainable practices in SIDS, is definitively an important step forward; however to date these initiatives are still very enunciative and more work is needed for developing sustainable tourism practices at a relevant scale that could secure the natural resources needed for catalysing the sustainable development of the SIDS.

C. Importance of fisheries

In terms of GDP fisheries seemed to be not as important as tourism; however, this does not mean fisheries are not important. In some places like Antigua and Barbuda fish represents one quarter of the total consumption of animal protein, for which it is relevant in terms of nutrition and food security.

In general, in the LAC region the importance of fisheries in nutrition is relevant for coastal communities, but accounts only for less than 10% of the animal protein consumption while considering the total population —5.96% in South America and 9.44% in Central America. However, for the SIDS in the Caribbean this proportion is notably higher representing 16.49%. Figure VIII.2 shows the importance of fisheries for the 16 SIDS at the Caribbean in contrast with the rest of the region and other SIDS worldwide. However, the dependence of fish protein in the regions is not as high if compared with other SIDS in the word for which fish represents 23% of total animal protein.

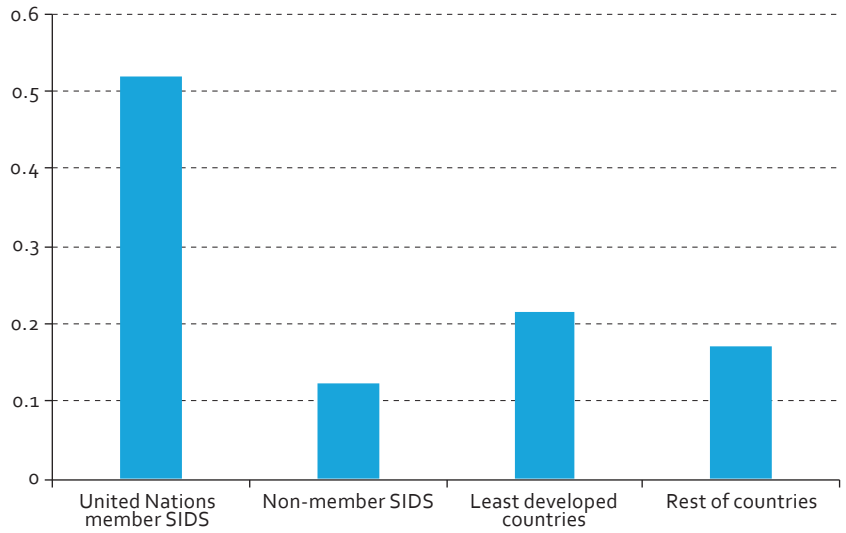
Figure VIII.2
Fish protein as a proportion of total animal protein consumption
(Percentages)



Source: Prepared by the authors on the basis of data from FAO (2020b) New Food Balances "FAOSTAT" [online database] http://www.fao.org/faostat/en/#data/FBS [accessed in November 2020].

Fisheries is important for SIDS nutrition, seafood security for future generations, and economic development, therefore the urgency to accelerate the path to sustainable fisheries that currently represents 0.5% of SIDS GDP, and 0.2% in the rest of the region. Figure VIII.3 shows sustainable fisheries as a percentage of GDP in SIDS, least developed countries (Haiti) and all countries in LAC, which is the indicator suggested by the United Nations to measure this goal.

Figure VIII.3
Sustainable fisheries as a proportion of GDP in SIDS, least developed countries, and all countries
(Percentages)



Source: Prepared by the authors based on FAO (2020c) "Indicator 14.7.1 - Sustainable fisheries as a percentage of GDP in small island developing States, least developed countries and all countries", Sustainable Development Goals [online] http://www.fao.org/sustainable-development-goals/indicators/1471/en [accessed in November 2020].
Note: Not all countries reported this indicator. In the case of United Nations member SIDS all reported except Cuba, the Dominican Republic and Saint Lucia. In the case of non-member SIDS there is information only for three countries (Bermuda, the Cayman Islands and Turks and Caicos Islands). The only least developed country in the region is Haiti and for the rest of the region only 12 countries reported this indicator (Argentina, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama and Peru).

IX. Target 14.A

Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.

Indicator: Proportion of total research budget allocated to research in the field of marine technology.

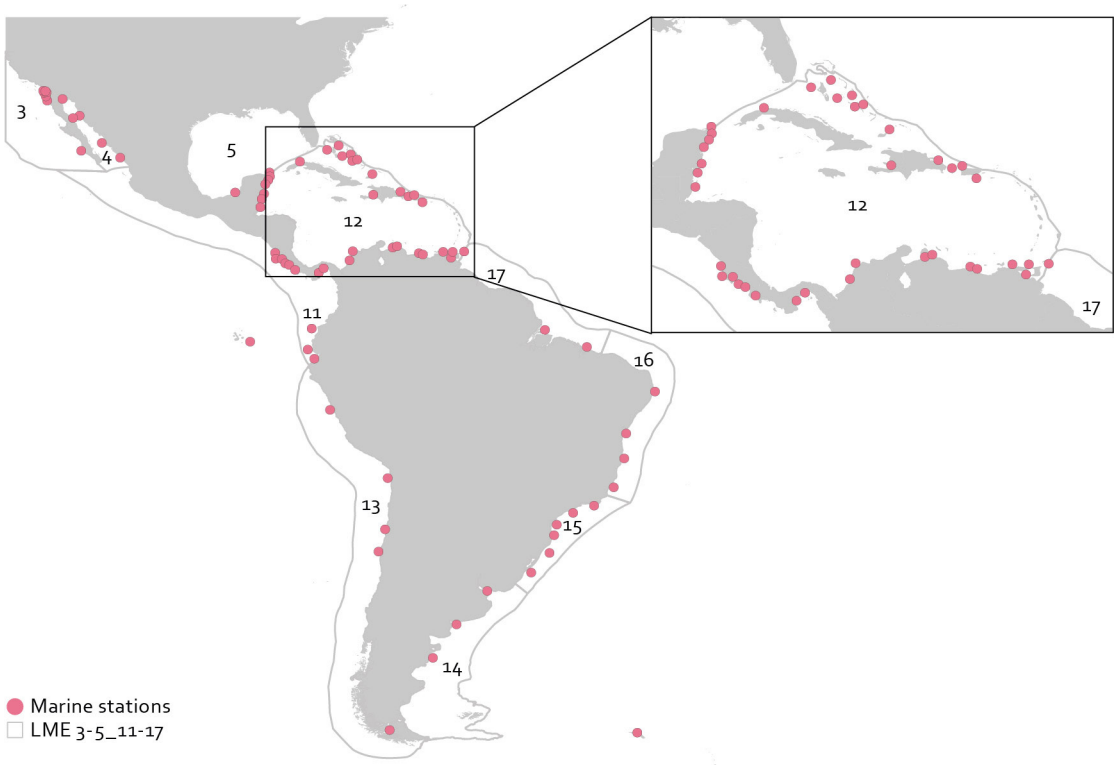
From the review carried out on the status of compliance of the SDG 14 in the LAC region, some of the crucial topics to get closer to the targets is the lack of available of crucial information required for decision-making. Also, information of socioeconomic and governance issues is required, such as impact of fisheries on SIDS or marginal communities, institutional arrangements, and its success on achieving public policy goals. Indeed, there is no regional data to follow up this target within LAC, so we propose to look at some proxies.

There are numerous initiatives, public and private, at a national, regional, and international levels created with the aim of producing reliable marine data in the LAC region. At a national level there are several national centres for oceanographic data that are aligned with the Intergovernmental Oceanographic Commission (IOC), as well as research programmes in national research centres. At a regional level, research networks have been created between national centres and international organizations to share information, take advantage of resources through the design of joint investigations which have greater scope, such as IOCARIBE a regional subsidiary body of the IOC; ODINCARSA, that states for Ocean Data and Information Network for the Caribbean and South America region with 19 countries participating; IBERMAR, Ibero-American Network for Integrated Coastal Management with 8 countries of LAC, among others. At an international level, there is a new project Ocean Info Hub Project (OIH) that aims to streamline access to ocean science data and information for management and sustainable development online and make a web platform openly accessible designed to support interlinkages and interoperability between existing resources.

Notwithstanding the foregoing, the information produced is not as reliable as one would like, it is scattered and not well systematized, mainly because of the lack of economic and human resources sustained over time, training and access to research facilities and infrastructure.

Monitoring is essential to sustain observations over time, marine stations, oceanographic vessels, operational floats (moorings and buoys), research facilities and laboratories. Six countries of the region (Brazil, Argentina, Mexico, Chile, Puerto Rico and Uruguay) are among the top 40 countries in terms of ocean science-related institutions (IOC-UNESCO, 2017). The region has 81 marine stations (10% of the world total) as shown in map IX.1.

Map IX.1
Marine research stations across the LAC region



Source: Prepared by the authors based on IOC-UNESCO (2017) Global Ocean Science Report - The current status of ocean science around the world. L. Valdés et al. (eds), Paris, UNESCO Publishing.

Financial support. Ocean science relies on sustained funding, international collaboration, and support from a variety of funding sources (IOC-UNESCO, 2017). The UNESCO report on SDG 9.5 to enhance scientific research states that LAC countries invest an average of 0.32 % (in 2017) of GDP in R&D (not specifically marine research) with Brazil having the highest percentage of investment with 1.3% of its GDP (eighth worldwide) followed by Argentina and Costa Rica with 0.6%. The countries with the highest investment (dollars) in R&D are Brazil, Mexico, Argentina, and Colombia (UNESCO-UIS, 2019).

OECD estimates, conservatively, that the output of the ocean economy was US$ 1.5 trillion (in value-added) in 2010 (OECD, 2016) and 2.5% of the global gross value added, but the investment in sustainable ocean economy is only of 13 billion in the last 10 years (Sumaila et al., 2020). The Investment in R&D is low and the countries in the region are trailing behind other economies (UNEP, 2016). Ocean science funding, as a share of national R&D funding, varies widely between countries from < 0.04% to 4% (IOC-UNESCO, 2017).

With regard to spending on research and development in ocean science in LAC, there are only figures for three countries in the region reported by ECLAC, about the percentage of the total budget of R&D dedicated to ocean science. The average of the last five years is: Brazil, 0.045%; Colombia, 0.56% and Peru, 7.76%, other data for 2013 indicate: Trinidad and Tobago 2.20%, Argentina 0.22%, Ecuador 0.04%, and Chile 0.19% on ocean science expenditure. There average in LAC region for 2017 is of 2.42% of the total resources of R&D (ECLAC, 2017).

About the research priorities, in LAC objectives that are set generally do not seek international competitiveness in high-technology activities, also some government research objectives are not up to date, because they maintain a framework of generating specific short-range information given the costs.

As a regional framework and science-informed process, the ecosystem - based management approach used in every LME programme with its five-module strategy supports assessments and monitoring in at least six LMEs in the LAC region. Table IX.1 shows the existing Global Environment Facility funded programmes and their plausible directed contribution to the SDG 14 targets and indicators. A new programme is currently under preparation in the Pacific Central American Coastal (PACA) that will contribute to marine spatial planning processes and sustainable fisheries.

Table IX.1
Global Environment Facility (GEF) funded programmes established in six Large Marine Ecosystems of the LAC region and their core contribution to SDG 14 targets and indicators

Gulf of Mexico LME	
14.1	Reduce pollution, harmful algal blooms and eliminate hypoxic zones
14.5	Create regional network on MPAs
14.6	Manage fishing effort; legal, policy and planning tools
14.A	Promote sustainability, new technologies and innovative economic instruments, ecosystem restoration, living marine resources
Caribbean Sea + LME 25 Countries	
14.3	Adapt to climate change, achieve regional objectives
14.4	Develop specific initiatives for IUU; Enhanced capacities to harmonized management and conservation on IUU
14.5	Coordinate regional, national efforts for biodiversity conservation of reefs. Strengthen MPAs
14.7	Initiatives for sustainable livelihoods, capacity building for diversification; Fostering viable alternative sources of Decent Work and/or improved incomes, and creating added value
Patagonian Shelf LME	
14.4	Strengthen responsible fishing practices, integrated management of fishing resources, mitigate incidental impact on the environment, and globally threatened species
14.6	Adopt and implement responsible fishing arts and protocols; Update and adjust legal, regulatory and institutional frameworks to ensure environmental protection use of resources
14.A	Apply economic mechanisms to stimulate use of new technologies to reduce polluting discharges
Humboldt Current LME	
14.2	Improve environmental quality of coastal and marine ecosystems, reduce pollution. Recover habitats and biodiversity
14.B	Establish preservation systems (artisanal, small-scale vessels, landing stages, transport and trade). Strengthen fishermen associations and marketing tools
Pacific Central America Coastal LME	
14.1; 14.4; 14.5	Promote ecosystem-based management through the strengthening of regional governance, marine spatial planning and sustainable fisheries

Source: Prepared by the authors based on GEF LME: LEARN (2017), The Large Marine Ecosystem Approach: An Engine for Achieving SDG 14, Paris, France, UNESCO [online] https://www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Water%20and%20Ocean%20Governance/Large_Marine_Ecosystem_Approach_22062017.pdf [accessed in August 2020].

X. Target 14.B

Provide access for small-scale artisanal fishers to marine resources and markets.

Indicator: Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries.

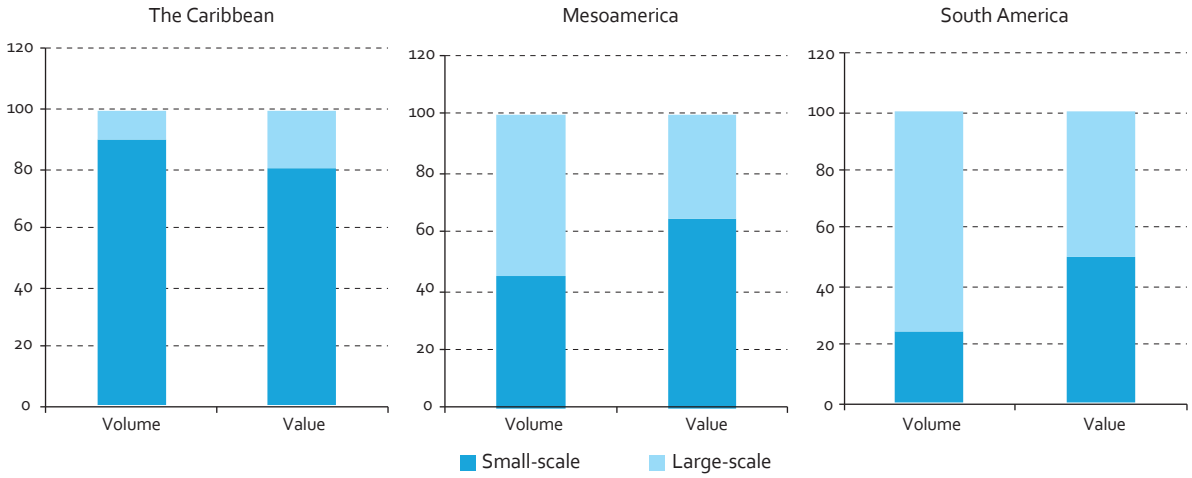
Small-scale fisheries (SSF) in the LAC region support livelihoods, employment and food security for more than 2.3 million people, accounting for about 16% of the global SSF catches, and almost 20% of the total landed value (TBTI, 2018). Nevertheless, in the region there is not enough data of the official indicator to measure this target, thus, the sector has been characterized including the SSF marked inequity and limited access to financial support faced within the fisheries sector. Considering the values embodied in the SSF sector, any policy toward them should identify the different dimensions of well-being to consider how they relate to and reinforce each other in a sectoral context.

The SSF has a core value related to its vernacular ecological knowledge, contribution to biodiversity conservation, through its lower carbon footprints and cost effective operations, its entrepreneurial performance to provide high social returns, their greater contribution to food security, nutrition to local consumers at affordable prices, its livelihoods among women within the short value chain, their contribution to the protection and security to coastal territories, and their vital contributions to the economy despite the limited subsidies and lack of support (Kurien, 2019; Allison et al., 2020).

Using the Seas Around Us (2020) database, based on the methodology of Pauly and Zeller (2015), the importance of SSF relative to total fisheries in the region was estimated (TBTI, 2018). For this analysis, the region was divided in three areas Mesoamerica, Caribbean, and South America.

As shown in figure X.1, SSF represent over 90% of the catches in the Caribbean region, more than 60% of the value in the Mesoamerican region. Even for South America in which SSF represent less than 30% of the catches, it represents almost half of the value of fisheries. Despite the fact of its socio-economic relevance, SSF does not have guaranteed access to adequate resources, with remarkable inequality towards and within the sector, lack of access to receive proper attention.

Figure X.1
Relative importance of small-scale fisheries versus total fisheries in the region
(Percentages)



Source: TBTI (2018) Latin America and the Caribbean Small-Scale Fisheries: A Regional Synthesis. Too Big to Ignore Research Report Number R02/2018. St. John's, Newfoundland, Canada.

Approximately 2.3 million people in LAC region are directly or indirectly involved with fishing activities (Chuenpagdee et al., 2019). The relevance of SSF in LAC becomes noticeable when we recognize that it contributes with over 10% of SSF catches at the global level (Salas et al., 2011). Moreover, the region is projected to economically grow considerably over the next decades, including in the fishing sector (+18%) according to the last report of the State of World Fisheries and Aquaculture (FAO, 2020a). Despite this promising future, reality is that coastal communities depending on commercial fishing for their livelihoods require extra attention due to the vulnerability they face in a context of rapid economic and climate related changes, as well as from diverse human induced pressures such as marine pollution.

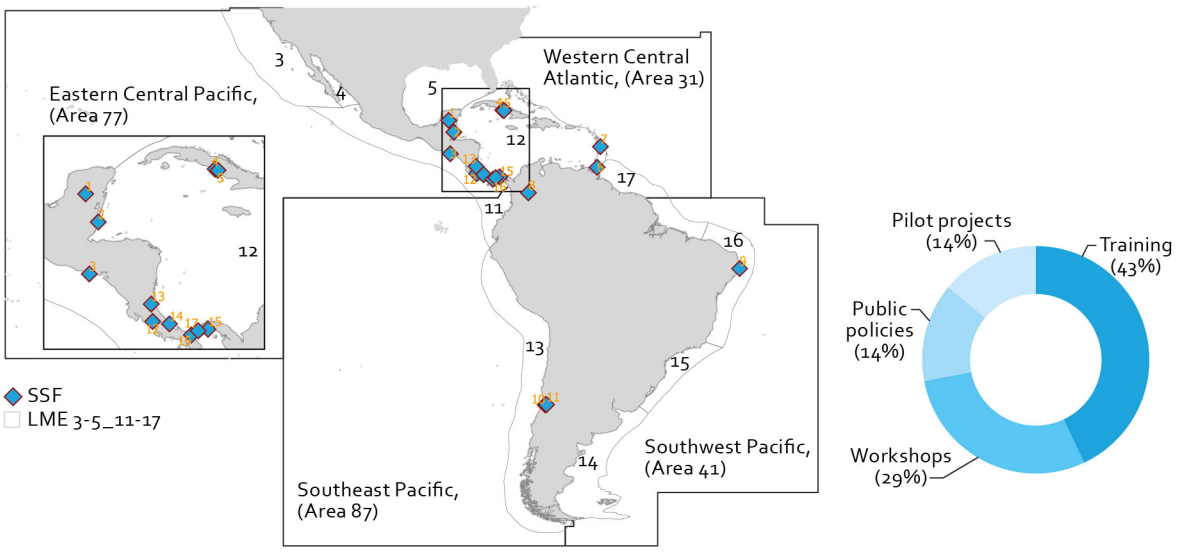
Existing inequity is a systemic feature of the current ocean economy, and unfortunately has strong roots in the LAC region, it is embedded in existing political and economic systems, the result of historical legacies and prevailing norms. This has brought global environmental challenges and negative effects on human well-being. Although legal frameworks partially exist to support equity, they are not sufficiently developed. In practice, ocean policies are largely equity-blind, contributing to current patterns of inequity. The effective implementation of existing international guiding policies may help redress the inequitable distribution of global commercial fish catches. At the local scale, SSF communities, particularly indigenous, women and other minority subgroups, often have relatively limited political power, are less likely to be included in decision-making processes and suffer disproportionately from depleted ecosystems (Österblom, et al., 2020).

The high diversity of ecosystems, and species make SSF too complex in terms of the differences in type of gear, fishing techniques, target species, governance systems and management schemes (de Oliveira Leis M. et al., 2019). All these complexities create challenges that require attention from local arrangements, national regulation, and regional cooperation. In this context, the opportunities for the region require an increased participation of communities in co-management systems, but also the adoption of international agreements and guidelines for promoting sustainability and viability of SSF (TBTI, 2018).

Considering the relevance of SSF, FAO developed the Voluntary Guidelines for Securing Sustainable SSF, in the context of Food Security and Poverty Eradication (SSF Guidelines), the first international instrument dedicated entirely to SSF, providing *ad hoc* guidance to this sector. This is the result of a long and intensive global bottom-up consultative process conducted between 2011 and 2014, based on the recommendations FAO Committee on Fisheries (COFI), and including more than 4,000 participants of more than 120 countries (FAO, 2015).

From 108 projects worldwide, in 2015 twelve were located in the LAC region (map X.1). FAO and national governments are developing efforts towards the application of the guidelines in their own local, social, and political contexts.

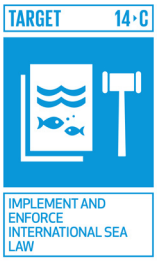
Map X.1
Activities identified by FAO to put small-scale fisheries guidelines in action



Source: Prepared by the authors based on FAO (2015) Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication, Rome.

Aim to increasing the support to SSF and the use of the guidelines, in June 2017 the Latin American and Caribbean Parliament (PARLATINO) created a legal framework to be used as reference for the development of national policies and laws (FAO, 2017). The model law recognizes the importance of SSF to livelihoods and food security of LAC people, identifies key issues for the development of the sector, and highlights the need to protect fishers' access rights, strengthen sustainability, promote gender equity, and acknowledge the contribution of the sector to reaching major global goals of ending hunger and alleviating poverty. This model will be key to support future data collection and information to sustain advances in the achievement of this SDG target.

XI. Target 14.C



Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in the United Nations Convention on the Law of the Sea, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of "The future we want".

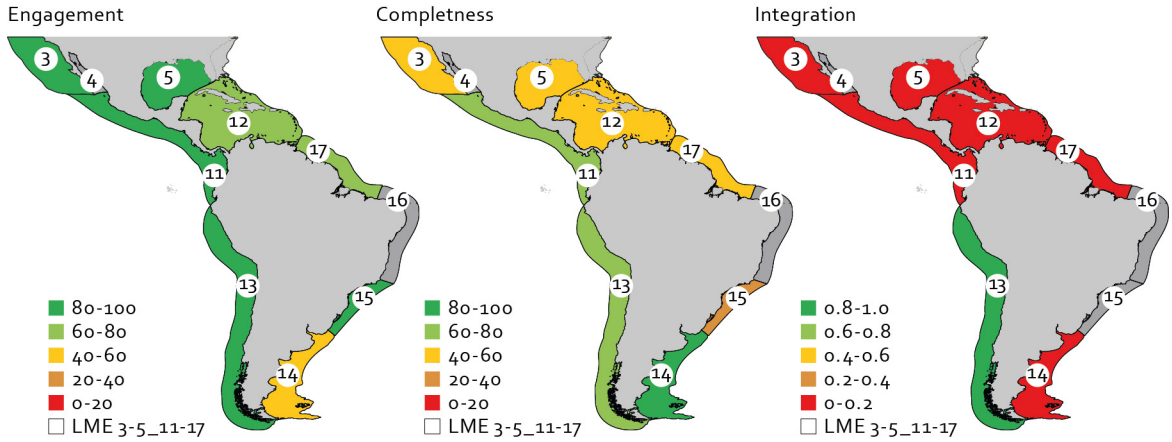
Indicator: Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nation Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources.

This target is related with United Nations Convention on the Law of the Sea (UNCLOS). This convention lays down a comprehensive regime of law and order in the world's oceans and seas establishing rules governing all uses of the oceans and their resources. It enshrines the notion that all problems of ocean space are closely interrelated and need to be addressed as a whole. UNCLOS addresses all governing aspects of ocean space, such as delimitation, environmental control, marine scientific research, economic and commercial activities, protection and preservation of the marine environment, transfer of technology and the settlement of disputes relating to ocean matters, among other issues. Only six LAC countries have not sign or ratified UNCLOS (Colombia, El Salvador, French Guiana, Peru, Puerto Rico, and Venezuela).

Nevertheless, international law of seas is not restricted to UNCLOS, there are many other treaties and conventions that address specific matters on oceans and seas. LAC region has developed its own legal international framework related with the sustainable use and protection of the sea and ocean, and its ecosystems, biodiversity, and species.

Two conventions span the entire region: Inter-American Convention for the Protection and Conservation of Sea Turtles, and Latin American Organization for Fisheries Development. On the Pacific side, the region has the Inter-American Tropical Tuna Commission, and the Lima Convention (with four protocols on land-based sources, hydrocarbons and radioactive pollution, and CMPA) and in the Atlantic side there is the International Commission for the Conservation of Atlantic Tunas. Among other treaties that cover important subregions such as Cartagena Convention, and its protocols (land-based sources of marine pollution, oil spills, and specially protected areas and wildlife) for the Caribbean.

Map XI.1
Governance architecture assessment related to existing agreements in the LAC region



Source: Prepared by the authors based on data from Fanning, L., et al. (2017) Transboundary Waters Assessment Programme (TWAP) Assessment of Governance Arrangements for the Ocean, Annex 1: Individual Governance Architecture Assessment for Fifty Transboundary Large Marine Ecosystems, CERMES-University of the West Indies.

Fanning et al., (2017) analysed the transboundary governance architecture in the context of the existing agreements, treaties, conventions and protocols in the LAC region. Map XI.1 shows the overall scores for this assessment and corresponding ranking of risk in region's LMEs. The assessment included the level of engagement of each country in each binding and non-binding agreement present in each LME that addresses the identified transboundary issues, the level of completeness of each transboundary arrangement in each LME, and the degree of integration among them. Despite the fact that the engagement is good in most of the region, the degree of completeness of adherence to the treaties decreases considerably and their lack of integration at the national level shows that there is a high degree of risk of the treaties not being followed.

The regional agreements that exist focus mainly on fisheries as a whole or for specific species (mostly tuna, also salmon, halibut, and anadromous stocks), and as related topics on biodiversity (marine protected areas and turtles) and pollution (land base sources, oil spills/hydrocarbons, radioactive contamination). There are four main agreements with a wide scope of topics: Cartagena Convention for Western Central Atlantic, Lima Convention for Southeast Pacific and Northeast Tropical Pacific, Antigua Convention for Northeast Tropical Pacific and the Rio de la Plata Treaty for the southern part of Southwest Atlantic.

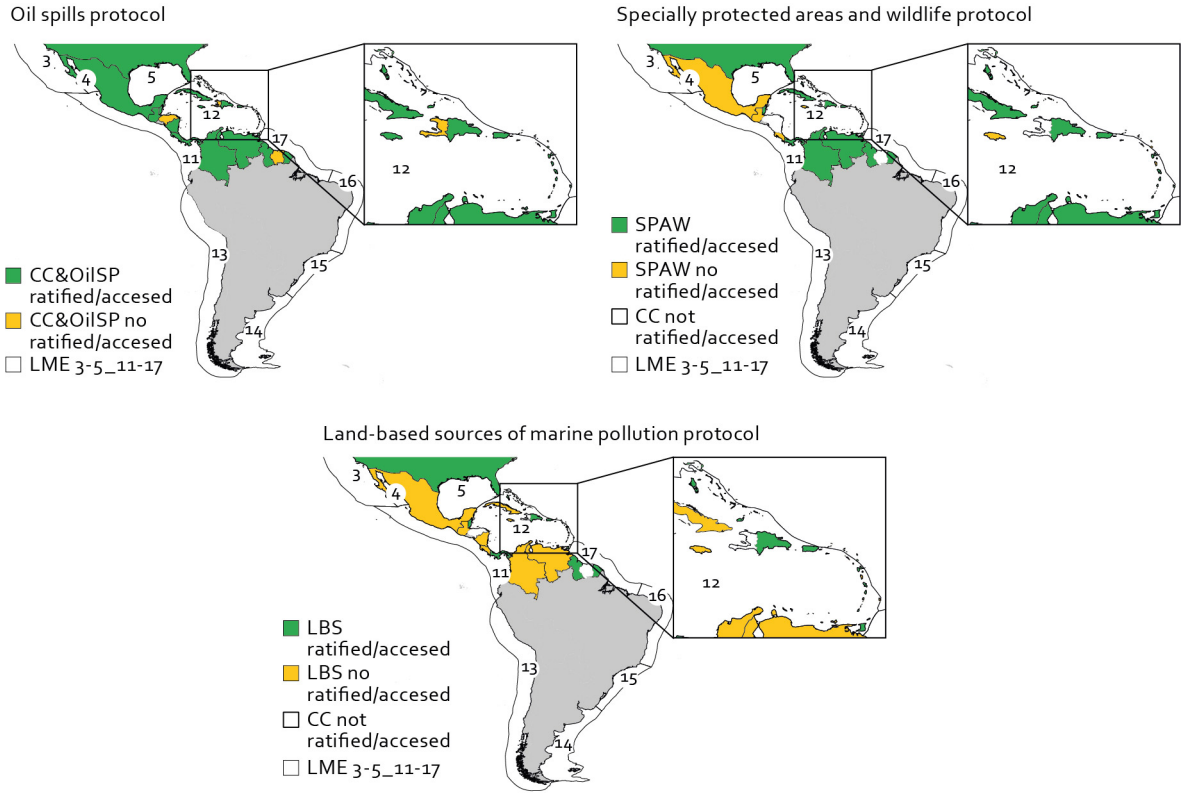
The integration and joint work between the existing agreements varies depending on the region. Except for the Southeast Pacific (SEP), in the rest of the cases the interaction is informal, and the coordination is weak or non-existent.

Regarding the indicator, there is no information provided on the SDG indicators meta-database repository (UN-SDG, 2020a) And the methodology for calculating it is still being discussed by UN-Oceans members, including the issue of reporting entities at the national level which are expected to respond to the questionnaire as well as the timing of the questionnaire (UN-SDG, 2020b).

As an example of signature and ratification of Conventions and Protocols in the region map XI.2 shows the status of Cartagena Convention.

The Cartagena Convention includes three protocols. Map XI.2 shows the level of ratification in each of them. The protocols for oil spills and specially protected areas and wildlife reflect the best performances and levels of engagement, while the protocol on land-based sources of marine pollution reflects much less success. This poses a threat to the entire wider Caribbean region considering that pollution is the most important threat to biodiversity, ecosystems, livelihoods, health and socioeconomic conditions.

Map XI.2
Cartagena Convention: signature and ratification status, 2020



Source: Prepared by the authors based on data from UNEP (2020) "Cartagena Convention" [online] https://www.unenvironment.org/cep/who-we-are/cartagena-convention [accessed in November 2020].

XII. Climate Change and Ocean Conservation

Take urgent action to combat climate change and its impacts.

The linkages between ocean conservation and climate change.

This section will review some of the direct relationships between the oceans and climate change in Latin America and the Caribbean with a focus on mitigation options. ECLAC has always emphasized the great vulnerability of the region to climate change in its coastal areas and the need to prioritize an adaptation agenda. Although most countries have adaptation strategies, plans and programmes that include actions related to coastal zones, not much attention has been paid to the opportunities that exist in climate change mitigation.

At the Paris Agreement nations pledged emissions reductions (Nationally Determined Contributions or NDCs) to prevent the threat of climate change. At the NDC in the region, the ocean has been incorporated at different levels; Central American and Caribbean countries include adaptation proposals in coastal areas to reduce the impacts of sea level rise and extreme events. They also propose nature-based solutions such as mangrove and coastal wetland restoration. Countries like Argentina, Brazil and Uruguay make few references to ocean, other countries like Peru and Chile include fisheries as priority for adaptation.

Ocean warming and acidification are damaging marine ecosystems and compromising the ability of the ocean to provide food, livelihoods, and safe coastal living on which billions of people depend (IPCC, 2019). Changes are occurring in wave characteristics and heights, penetration inland, surface water temperature, salinity, the meteorological component of tides and the dynamics of extreme events (hurricanes and El Niño Southern Oscillation). This will increase the complexity of impacts and the vulnerability of the region's socioeconomic and ecological systems. Thus, the expectation is of increased coastal erosion, greater bleaching of corals, a reduction in some tourist uses and beach coastal defence, a loss of port infrastructure operability, impaired maritime works safety and greater flooding of ecosystems. Sea level rise increases risks to low-lying coastal zones and the exposure of people living in coastal areas. This threat, enhanced by the increasing occurrence of extreme events, is especially important in the case of the SIDS countries of the Caribbean (ECLAC, 2020).

For the LAC region, the impacts of climate change in the FAO fishing areas are noting several potential negative effects such as the presence of pelagic sargassum into the wider Caribbean, negative effects on fisheries in the Atlantic Southeast, ocean acidification in the Gulf of California and changes in the favourable conditions for fisheries affected by the Humboldt Current. So, the impacts are different for each of the FAO fishing areas. For the Western Central Atlantic, the impacts are well studied, identifying the increase in sea surface temperature, ocean acidification, sea level rise, and the slow-down of the Atlantic meridional overturning circulation. The predicted consequences are more frequent flooding events, mangrove, and coastal degradation due to changes in runoff patterns, and the influx of southern Atlantic water with lower salinity and presence of pelagic sargassum into the Caribbean (Sasmito et al 2016 and Zhao et al 2016). The Atlantic Southeast is a warming hotspot where sea surface temperatures have increased rapidly over the past 50 years. Changes in fish distribution and abundance, increase of the saline influence in the estuaries is affecting the dynamics of estuarine dependent fisheries (Defeo et al, 2013 and Roessig et al 2004).

The observed and projected climate trends and their impacts in the Pacific Central East are diverse among the California Current, the Gulf of California, and the Pacific Central American Coastal (Muller-Karger et al., 2017). There are major threats for the Gulf of California such as ocean acidification, hypoxia, and harmful algal blooms, whereas in the Pacific Central American Coastal, high sensitivity to climate change is related to coastal ecosystems' degradation. Finally, the Southeast Pacific (SEP) region exhibits possible scenarios of climate change in the Humboldt Current El Niño events may become more frequent and major regime shifts may happen, changing the existent favourable state in terms of fish productivity. Warming and a tropicalization can be expected to lead to a shift of tropical species southwards, opening some opportunities for Small Scale Fisheries (Cai, et al., 2015, Gutierrez, et al., 2017 and Fedorov et al., 2015).

As mentioned above, there are few considerations in the region of the ocean as a solution for climate change mitigation[4]. In this sense the High Level Panel for Oceans commissioned a Blue Paper for thinking in the oceans as a solution to climate change (Hoegh-Guldberg. O., et al. 2019). At this paper five solutions were studied at global level, in the next sections these solutions will be analysed for LAC.

A. Ocean-based renewable energy

There are several options for ocean-based renewable energy such as wave energy, tide energy, and the use of temperature and salinity gradients to produce energy. Despite its enormous potential, there are very few investments in offshore wind power in Latin America and the Caribbean. Brazil is the leading country with six offshore projects under review for licenses (IRENA, 2019). At the port of Pecém, in Ceará (Brazil), it was the first plant in Latin America to use the movement of the sea waves to produce electricity. This pilot project aims at exploring technologies that can produce electricity from the sea with reliable supply and at viable costs.

Worldwide one of the most promising options for the region in the short run is the use of offshore wind energy. New technologies, economies to scale, maturation of supply chains and better procurement strategies had resulted in a continuous reduction of prices for producing offshore wind energy (ESMAP, 2019). Today this technology is used in Europe and it is expected to be used in an accelerated rate in the rest of the OECD countries; but there is also an opportunity for developing countries to ramp up their own production.

In March 2019, the World Bank Group and the International Finance Corporation (IFC) launched an offshore wind programme to fast-track the adoption of offshore wind in developing countries. This initiative has created a Global Wind Atlas with information from more than 48 countries grouped in 6 regions. Table XII.1 shows the offshore wind potential in these regions, showing LAC as the one with highest potential.

[4] In the update of the NDC of Chile (2020) there is a chapter dedicated to the oceans, with commitments in the creation of new protected areas, including coastal ecosystems such as wetlands (Government of Chile, 2020).

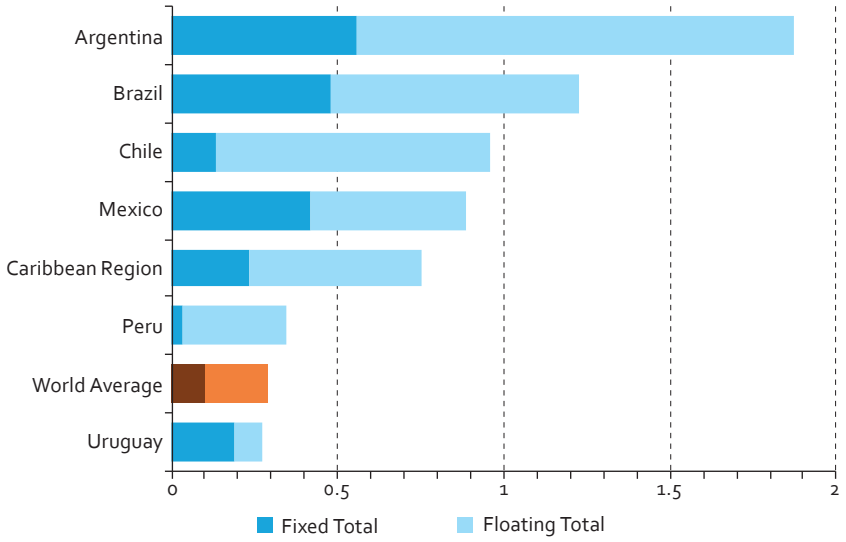
Table XII.1
Total technical potential for offshore wind generation by region

Region	Total technical potential (TW)	Highlights
Latin America and the Caribbean	6.3	Highest regional potential
East Asia Pacific	4.4	China has the largest potential of any country
Sub-Saharan Africa	2.3	Strong potential, primarily in floating technologies
Europe and Central Asia	1.2	Favourable conditions in the Black and Caspian Seas
Middle East and North Africa	1.2	Moderate resource, primarily in floating technologies
South Asia	0.3	Some good but limited resources

Source: Knight, O., S. Whittaker, M. Laybourne (2020) "Offshore Wind Development Program Overview - June 2020", World Bank Group [online] http://pubdocs.worldbank.org/en/120581592321163692/WBG-Offshore-Wind-Program-Overview-Jun2020.pdf [accessed in November 2020].

In LAC there are countries with more potential than others, in which investments must be prioritized. Figure XII.1 show the potential in these countries. The average of the 48 countries included in the atlas is presented as a benchmark to emphasize the potential of the region. There are two different technologies represented in figure XII.1; the fixed technologies which is the state of the art and the floating technologies that still developing and could triplicate the potential for offshore wind energy generation.

Figure XII.1
Technical potential for offshore wind generation in Latin America and the Caribbean



Source: Energy Sector Management Assistance Program, ESMAP (2020) "Offshore Wind Technical Potential" [online database]. Global Data Set. https://energydata.info/dataset/offshore-wind-technical-potential [accessed in November 2020].
Note: World Average is based on authors' estimations not reported by ESMAP but calculated based on information from the ESMAP Database.

The Global Wind Atlas also presents data for Jamaica, Haiti, the Dominican Republic, the Bolivarian Republic of Venezuela, Colombia, and Nicaragua. In these cases, total or partial part of their potential was included as part of the Caribbean region. To highlight the importance of the Caribbean without atomizing the information between the different states of the region, it was decided to present aggregated data.

B. Ocean-based transport

Current GHG emissions from global ocean transport represent around 3% of global anthropogenic CO_2 emissions (Smith et al., 2016). In the year 2018, the movements of containerized goods in LAC's ports accounted for 53.2 million twenty-foot equivalent units (TEU) value equivalent to 7.1% of global throughput in the same period (ECLAC, 2019). If growing trends on maritime transport continue, CO_2 emissions will double for 2050, compared to 2010 (Hoegh-Guldberg et al., 2019).

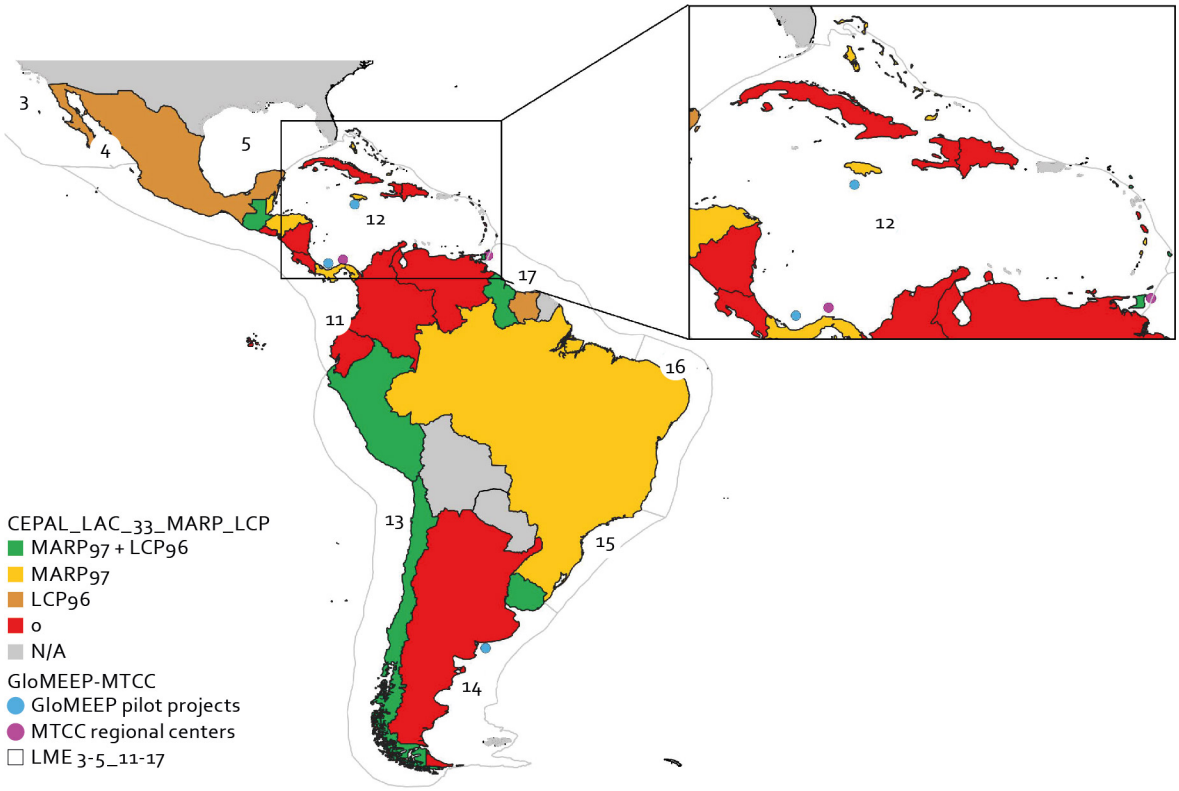
Considering that since 1970, energy efficiency in maritime transport has improved by only about 1% per year (Lindstad and Eskeland, 2018), it is possible then to considerer that there are important opportunities for reducing emissions from this source. In particular, the energy intensity and the absolute GHG emissions of ocean-based transport can be reduced in the following ways: (1) technical and operational interventions to reduce energy consumption per ton transported, and (2) substitution of low- and zero-carbon fuels for diesel and bunker oil (Hoegh-Guldberg et al., 2019).

Given that the majority of the GHG emissions form shipping occur in international waters, national allocation of responsibilities is complex, for which the intervention of the United Nations International Maritime Organization (IMO) is pertinent. In response to this the IMO published the internal document *TC.1-Circ.69* stating the linkages between IMO's technical assistance work and the 2030 agenda for sustainable development (IMO, 2017), at which five main actions are considered:

- Establishment of a global network of maritime technology cooperation centres (MTCC), formed by five regional centres that include a regional centre for Latin America and a regional centre for the Caribbean (IMO, 2020a).
- Implementation of the Global Maritime Energy Efficiency Project (GloMEEP) aimed at supporting the uptake and implementation of energy efficiency measures for shipping. There are 10 lead pilot projects of the GloMEEP, 3 of them in the LAC region: Argentina, Jamaica, and Panama.
- Training programmes on the current IMO regulations on Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP).
- Promoting the ratification and implementation of the London Convention and London Protocol.
- Promoting the ratification and enhancing effective implementation and enforcement of Annex VI of the International Convention for the Prevention of Pollution from Ships (MARPOL). Annex VI sets emission limits for some pollutants, while a chapter adopted in 2011 covers mandatory technical and operational energy efficiency measures aimed at reducing greenhouse gas emissions from ships.

Map XII.1 shows the use in the LAC region of the different tools provided by IMO to reduce GHG from maritime transport. The map indicates that only four continental countries and few island nations had ratified both instruments. In addition, the map indicates the three countries where IMO is developing pilot projects for the implementation of the Global Maritime Energy Efficiency Project (GLoMEEP); and the two regional centres of the global network of maritime technology cooperation centres (MTCC).

Map XII.1
Latin America and Caribbean: use of the different tools provided by IMO to reduce GHG from maritime transport



Source: Prepared by the authors based on: (a) IMO, 2020a. "Global maritime technology cooperation center network officially launched", Press release, 4 December 2017 [online] https://www.imo.org/en/MediaCentre/PressBriefings/Pages/36-MTCCMOU.aspx [accessed in November 2020]; (b) IMO (2020b) "Status of Conventions", [online database] updated September 12, 2020, https://www.imo.org/en/About/Conventions/Pages/StatusOfConventions.aspx [accessed in November 2020]; and (c) Global Maritime Energy Efficiency Project. (n.d.) [online] https://glomeep.imo.org/ [accessed in November 2020].

C. Coastal and marine ecosystems

Conserve and restore existing blue carbon ecosystems such as mangroves, seagrass beds, and salt marshes present an important opportunity to prevent further release of GHG emissions. These actions could contribute to mitigate 1.4% of the needed annual GHG emissions reductions by 2050 (Hoegh-Guldber, 2020). For the case of LAC region, mangroves represent the highest opportunity for conserving and restoring blue carbon ecosystems.

Mangroves have the capacity to storage between three to four times more carbon than most of the forest in the planet (World Bank, 2019), and account for about 3% of the carbon sequestered by the world's tropical forest (Alongi, 2012); this makes mangroves one of the most efficient ecosystems for storing carbon. In addition, mangroves provide several goods and services that help people on strategies for climate change adaptation. Mangroves provide production services like shore stabilization, biodiversity conservation, disaster mitigation, as well as providing livelihoods for communities that depend in fish, recreation and firewood provided by mangrove ecosystems (Worthington and Spalding, 2018).

Between 1996 and 2016 a total area of 9,736 km² of mangrove has been lost worldwide, of which 6,630 km² are still highly restorable; the overall restoration of this recently lost mangroves could led to a reduction of 364 million tons of carbon to the atmosphere —including storage of carbon aboveground

biomass and the avoidance of emissions of soil carbon (Worthington and Spalding, 2018). Only four countries (Brazil, Colombia, Cuba, and Mexico) account for 97% of the continental potential and 24.8% of the global potential for carbon storage due to restoration.

Table XII.2
Potential in terms of restorable aboveground biomass and soil carbon

Concept	Restorable carbon tons (million)		
	Soil carbon	Aboveground biomass	Total
Brazil	15.2	4.0	19.2
Colombia	9.0	1.9	10.9
Cuba	7.5	1.1	8.6
Mexico	42.3	9.5	51.8
North and Central America and the Caribbean	77.8	15.3	93.1
World	296	68	364

Source: Worthington and Spalding (2018) Mangrove Restoration Potential. A global map highlighting a critical opportunity; IUCN, The University of Cambridge, and The Nature Conservancy.

In addition to the vast mangrove areas around the LAC region, the sea grass beds represent another opportunity to induce restoration activities at the local coastal community level linked to small fishing villages. Seaweed farming has also proven its high economic feasibility and it may be taken as another good opportunity for the region. In LAC region, sea grass beds are distributed mainly in Atlantic coast of Mexico, Central America, the Caribbean, and the northern part of the South American Atlantic coast. The top five countries having more sea grasses are: Mexico, Cuba, Nicaragua, Belize, and Honduras (UNEP-WCMC, n.d.). These ecosystems do not cover large proportions of the territory, on the contrary, are mainly scattered areas.

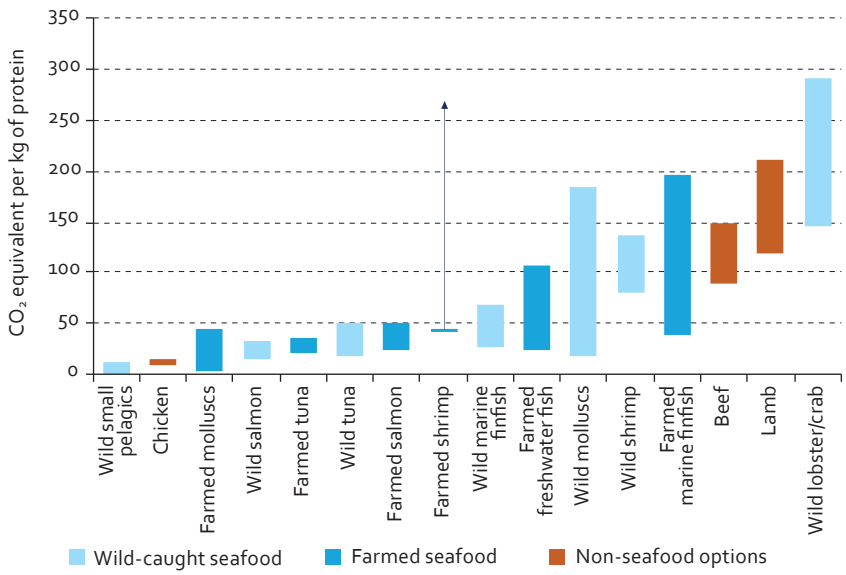
D. Fisheries, aquaculture and dietary shifts

According to IPCC the Agriculture, Forestry, and Other Land Use (AFOLU) sector accounts for almost a quarter of the anthropogenic greenhouse gas emissions mainly from deforestation and agricultural emissions from livestock, soil, and nutrient management (IPCC, 2018). One of the demand-side options for reducing GHG emissions from AFOLU is the change in human diets towards less emission intensive products (Stehfest et al., 2006). To understand the seafood potential for reducing emissions by shifting diets, figure XII.2 presents the carbon dioxide equivalent for every kilogram of protein from different seafood products. Figures for beef, lamb and chicken were also included as reference.

One of the first things that arise from figure XII.2 is that protein production from lobster and crab wild fisheries could be even higher that the case of livestock products which are considered some on the highest contributors of the AFOLU sector. This could be explained because in the case of high value products, fishers could have profitable trips bringing few kilograms of product.

The upper bound of most of the seafood products in figure XII.2 report less carbon emission than the lower bound of beef and lamb production, which suggest a relevant opportunity to reduce emissions by shifting to seafood. The case of small pelagic fish also deserves attention; while species like sardine or anchovies produce food with high nutritional value, but the product is often used as meal for aquaculture products with less nutritional value per carbon emission.

Figure XII.2
Carbon emissions in food production



Source: Prepared by the authors based on data from Monterrey Bay Aquarium Seafood Watch and Dalhousie University (n.d.) "Seafood Carbon Emission Tool" [online database] http://seafoodco2.dal.ca/ [accessed in November 2020].

For the case of cultivated shrimp, figure XII.2 includes an arrow to illustrate that in those cases where mangrove is removed for shrimp farming the emissions could rise up to ten times more, being more inefficient (in terms of carbon) that any other kind of food shown in this chart. The difference between sustainable and non-sustainable practices is not exclusively of shrimp farming; in most of the cases shown in figure XII.2 there are significant differences between the lower and the upper bound.

Finally, figure XII.2 also shows that of all farmed options, molluscs account for the lowest emissions. This is because molluscs do not require feeding in mariculture systems. In general, the most efficient mariculture systems worldwide are those that do not require feeding. For some regions with high demand for algae, the farmed production of seaweed is a promising option (Costello et al., 2019); however, for the LAC region the no-feed mariculture of molluscs should be explored.

The question is if shifting to seafood products could be an option for reducing emission from food production, in a context at which only 65.8 of the fish stocks remained at sustainable levels (FAO, 2018b). The answer is uncertain, but there are some conditions needed for making this shift possible and useful.

To have a seafood sector able to support human diets less intensive in carbon it is necessary to improve fisheries management to avoid overfishing, eliminate harmful fishing subsidies, tackle IUU, support small scale fisheries, and build a no-feed mariculture sector with good regulation that could produce high quality seafood with low emissions and high sustainability standards. The question now is how LAC region is towards these needs.

- The region is not ready for a shift to diets more intensive in wild caught seafood, as shown in the analysis of target 14.4.
- As shown when analysing target 14.6, fuel subsidies still setting incentives for carbon intensive fishing activities, without the elimination of harmful subsides shifting diets to seafood could fail on reducing food carbon footprint.
- If IUU is not addressed, fish stocks are threatened and the viability of a low-carbon seafood diet does not seem possible.

- Small scale fisheries are more efficient in fuel use than industrial. Supporting small scale fisheries and local diets is an important strategy to shift to more carbon efficient diets. It is recommended for LAC countries to follow the FAO Voluntary Guidelines for Securing Sustainable SSF.
- The low level of fish stocks could hardly support an increase in wild seafood production and inshore aquaculture will have land use limitations. However, mariculture (offshore aquaculture) presents and option that is expanding and still have opportunities to expand (FAO, 2020d). Some types of mariculture requires fish meal in its production process (tuna, marine fish); while others could function well without adding food —molluscs and seaweed (Costello et al., 2019). It is important to explore in the region more opportunities for developing a mariculture industry with high sustainability standards.
- It is also recommended to develop further analyses on how food waste reduction and promotion of local consumption could play an important role for shifting to more sustainable and carbon efficient diets.

E. Carbon storage in the seabed

Each year about 25% to 30% of anthropogenic CO_2 emissions, enters the ocean (Hoegh-Guldberg. O. et al. 2019). As a result, there is considerable theoretical potential to store CO_2 (once captured and compressed) in the ocean (GESAMP, 2019).

Storing carbon in seabed has the potential to reduce 2% the needed annual GHG emissions reductions by 2050; doing so requires that CO_2 be concentrated, compressed, and transported to the deep-water injection site. This process does not involve major technical advances and is an extension of activities that are already being carried out on land; however, scaling up to the magnitude of the problem is a major challenge. Besides the technological challenges, it is also important to recognize that this process faces significant economic, and sociopolitical questions (e.g. environmental safety). All these must be adequately explored prior to deployment at the scale required to make a substantive contribution to solving the climate problem.

In Latin America and the Caribbean there is an experience of storing carbon in the seabed. Since 2015, one Carbon Capture and Storage (CCS) facility has been operating in South America —Brazil's Petrobras Santos Basin. In December 2017, Petrobras reached a milestone of 7 Mt of CO_2 captured and reinjected. An annual CO_2 injection of 2.5 Mt was achieved by 10 floating production storage and offloading units.[5] There is no estimations of the regional potential. This solution has high potential, but also relevant challenges.

[5] The document on The Ocean as a Solution to Climate Change; Five Opportunities for Action includes a Detailed Analysis of the wider impact of Ocean-based interventions and mitigation options on Sustainable Development Dimensions. Regarding the injection of CO2 into submarine geological structures some studies point out the substantial risk of leakage of CO2 back into the marine environment and its ecosystems.

XIII. Recommendations

Reduce marine pollution

- Both nutrient pollution and marine debris should be addressed with a watershed vision, for being problems that start on the land side and end at the ocean mainly by discharges and runoffs.
- International collaboration is required for the adequate attention of marine pollution, given the transboundary implication of the problem.
- All Caribbean countries should urgently ratify the Protocol concerning Pollution from Land-Based Sources and Activities (LBS Protocol) of the Cartagena Convention for the Protection and Development of the Marine Environment in the wider Caribbean region (WCR).
- It is important to accelerate the actions of the Regional Action Plan on Marine Litter Management (RAPMaLi) to reduce marine litter at the Caribbean.
- Develop protocols, actions, and programmes like LBS and RAPMaLI for the rest of the LAC region.

Minimize the impacts of climate change and ocean acidification

- Develop ocean-based solutions for climate change mitigation including offshore energy generation, blue carbon, reduction of emission in maritime transport and shifting diets.
- Strength measures to protect coral reefs which is the most affected ecosystem by ocean acidification; for which monitoring, and restoration programmes should be considered.
- Build capacities for adaptation of coastal communities to climate change. Financial capacities, green infrastructure, alternative livelihoods, sustainable use of natural resources are some of the options for the adaptation of coastal communities to climate change.
- Strength legal and institutional framework to address other problems that impact coral reefs besides ocean acidification such as invasive species, pollution, and unsustainable fisheries and tourism.
- Build knowledge, adapt technology, and create the legal and institutional framework to develop the potential for offshore wind generation, specifically for Argentina, Brazil, Chile, Mexico, and the Caribbean.

- Create the capacities for fostering the action plan of IMO to comply with the 2030 Agenda, with special attention on those needed for the adherence, ratification, and implementation of the Annex VI of the MARPOL convention.
- Develop the potential in the region for climate change mitigation and adaptation through mangrove restoration specially in Mexico, Brazil, Cuba, and Colombia. In the context of the recovery from the economic and social crisis caused by COVID 19, especially in the tourism sector, employment programmes could be implemented in coastal areas aimed at recovering this kind of ecosystems.
- Develop a regional strategy for reducing the food carbon footprint of the region that includes low carbon option of wild fisheries and aquaculture, considering also the importance of non-fed mariculture, the reduction of food-waste and the promotion of local food diets.

Accelerate the transition to more sustainable fishing

- Effectively regulate harvesting, by building capacities to improve data collection and to elaborate science-based management plans according to the principles of the FAO Code of Conduct for Responsible Fisheries, under poor data conditions.
- Support fishing communities, mainly social enterprises, to improve fisheries management through voluntary mechanisms such as Fishery Improvement Projects and certification.
- Build a blueprint with experts in fishing technology and fish behaviour to create alternative fishing systems (technology and practices) to eliminate the destructive fishing practices on ecosystem, protected species, and commercial fish species.
- Prohibit fisheries subsidies which contribute to overcapacity and overfishing as well as those that contribute to illegal, unreported, and unregulated fishing.
- Given the low proportion of the global subsidies given by LAC countries, the region should make a coalition to support a strict agreement within WTO to eliminate capacity enhancing subsidies.
- Build a multi-stakeholder dialogue towards a transition from harmful fishing subsidies to investments that support sustainable fisheries is essential, with especial attention to equity and small-scale fisheries.
- Build capacities for the compliance of the four international instruments to deter IUU and advocate for its adherence and ratification (United Nations Convention on the Law of the Sea, Port State Measures Agreement, Fish Stocks Agreement, and Compliance agreement).
- Tackle the drivers associated with IUU at the three levels: improving governance, eliminating incentives for IUU, and removing barriers to enforcement.
- Financing and implementing projects that increase the level of participation of fishing communities in co-management and community-based fisheries management approaches with a clear definition of access rights and governance systems.
- Working jointly with the financial sector and all agents in the seafood supply chain to improve the access to markets for the SSF and to develop clear traceability systems.
- Prioritize south-south collaboration to take advantage on the similarities between countries and the difference of progress among countries in the region.

Protect and restore ecosystems and conserve coastal and marine areas

- Mangrove protection and restoration should be considered a priority.
- For protecting and restoring mangroves it is important to consider participation of local communities and women, restoration of geological and hydrological integrity of the natural system, and development of innovative financial mechanisms.
- Efforts should be maintained over time to effectively protect in the long term all marine protected areas. In this sense it is recommended to follow the IUCN Green List Standard for Protected and Conserved Areas.

- There is high heterogeneity of the compliance of the MPA indicator among the different countries, thus it is recommended to strength actions in those countries below the target to have at least 10% of its EEZ under a category of conservation or sustainable management.
- Other parameters beyond the area covered by marine protected areas should also be considered, such as those in Aichi target 11, which prioritize areas of particular importance for biodiversity and ecosystem services, ecologically representativeness and integration into larger landscapes, among others.
- Start working with IUCN Green List Standards: (1) legitimate equitable and functional governance agreements, (2) assessments and regulations of the economic activities for not impacting the ecological integrity of the area, (3) sound management plan with long term conservation goals (4) sufficient staff and resourcing to comply with the MPA goals and track performance, and (5) adequate scale or to be part of a corridor to be able to protect migratory species and natural processes.

Increase the economic benefits to Small Island Developing States (SIDS)

- Make tourism the driver of sustainable development for SIDS; for which it is important that governments and the tourism industry work closely with the UNWTO to develop a local and concrete action plan to foster the sustainability of the tourism for the SIDS at the Caribbean.
- Tourism has been of the most affected industries by the spread of the SARS-2-COVID-19; thus it is indispensable to develop a plan towards an inclusive, resilient, and sustainable green recovery of the industry.
- In case of SIDS with small governmental budgets and high challenges, the importance of public-private partnerships is critical. It is important to work jointly with the tourism industry to develop a more ambitious strategy for the evaluation of cruise companies, resorts, and destinations under international certification standards of sustainability.
- All recommendations of climate change adaptation and mitigation, sustainable fisheries, and marine pollution should be addressed and supported with special attention in SIDS, which are highly dependent in ocean resources for people nutrition and economic development.

Increase scientific knowledge about the ocean

- Take advantage of the Decade of Ocean Science for Sustainable Development (2021-2030) to create momentum and synergies to improve and advance in the required marine and ocean research.
- Ocean agenda requires international multidisciplinary and cross-sectorial collaboration for which the strengthening of research, observation and monitoring networks using comparable methodologies in a systematic and coordinated way is indispensable.
- Secure long-term monitoring networks able to evaluate the evolution of the main indicators and ocean health.
- Promote the use of new technologies, such as drones, remotely operated vehicles (ROV) and autonomous unmanned underwater vehicles (AUV), remote sensing, underwater microphones, etc. to carry out research and observation.

Implementation of the Law of the Sea

- Build capacities for the ratification and implementation of the United Nations Convention on the Law of the Sea.
- Given the large number of agreements, conventions, and protocols, put special attention on advocating for the ratification and compliance of those identified as necessary for the compliance of the SDG 14 implementation of the Law of the Sea such as the protocol on LBS Protocol of the Cartagena Convention (see SDG 14.1), the four treaties of international framework for addressing IUU (see SDG 14.6), and the Annex VI of the MARPOL Convention.

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Acronyms

AFOLU	Agriculture, Forestry, and Other Land Use
CCS	Carbon Capture and Storage
CEP	Caribbean Environmental Programme
CMPA	Conservation of Marine and Coastal Protected Areas
COFI	FAO Committee on Fisheries
ECLAC	Economic Commission for Latin America and the Caribbean
EEDI	Energy Efficiency Design Index
EEZ	Exclusive Economic Zones
ESMAP	Energy Sector Management Assistance Program
FAO	Food and Agriculture Organization
FIP	Fishery Improvement Projects
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GloMEEP	Global Maritime Energy Efficiency Project
ICC	International Coastal Clean-up
IFC	International Finance Corporation
IMO	International Maritime Organization
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature'
IUU	Illegal, unreported, and unregulated fishing
LAC	Latin America and Caribbean
LBS	Land Based Sources
LME	Large Marine Ecosystems
MABR	Mesoamerican Barrier Reef
MARPOL	International Convention for the Prevention of Pollution from Ships
MC11	Eleventh WTO Ministerial Conference
MPA	Marine Protected Areas
MSC	Marine Stewardship Council
MSY	Maximum sustainable yield
MTCC	Maritime Technology Cooperation Centers
NDC	Nationally Determined Contributions
NOAA	National Oceanic and Atmospheric Administration
ODINCARSA	Ocean Data and Information Network for the Caribbean and South America
OECD	Organization for Economic Co-operation and Development
OHI	Ocean Health Index
OIH	Ocean Info Hub Project
PACA	Pacific Central American Coastal
PARLATINO	Latin American and Caribbean Parliament
R&D	Research and Development
RAPMaLi	Regional Action Plan on Marine Litter Management
RFMO	Regional Fisheries Management Organizations
SCTD	UN Steering Committee on Tourism for Development
SDG	Sustainable Development Goals
SEEMP	Ship Energy Efficiency Management Plan

SEP	Southeast Pacific
SIDS	Small Island Developing States
SPAW	Specially Protected Areas and Wildlife
SSF	Small scale fisheries
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNWTO	United Nations World Tourism Organization
WCR	Wider Caribbean Region
WTO	World Trade Organization
WTTC	World Travel and Tourism Council

Oceans are a vast source of solutions and opportunities which, unfortunately, are currently invisible, at risk or underutilized. For Latin America and the Caribbean, this reality is significant —more than 27% of the region's population lives in coastal areas; the sea accounts for a larger share of territory than land for most countries, especially in the Caribbean; and the oceans are home to extraordinary biodiversity. Still, we are not yet on a path to achieving the targets of Sustainable Development Goal 14 relating to life below water.

The Economic Commission for Latin America and the Caribbean (ECLAC) has produced the first regional outlook for oceans, seas and their resources in order to fill information gaps and propose ideas that strengthen blue sustainable development efforts. This study will serve as a tool for regional mechanisms and coordination efforts, by suggesting new alternative indicators for some targets of Sustainable Development Goal 14 and viewing the oceans as a source of solutions for climate change mitigation. It presents an opportunity to advance in the cross-cutting and blue implementation of the 2030 Agenda for Sustainable Development with oceans at the core.

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