

# *Equilibrio*

MEDIO AMBIENTE + RESPONSABILIDAD SOCIAL



Photo: Rodrigo Friscione.



Rodrigo Friscione/Getty Images

# Mexico protects its oceans

Beta Diversidad, CODEMAR, and the Pew Bertarelli Ocean Legacy Project welcome Mexico's establishment of a fully protected national marine park in the waters surrounding the Revillagigedo Archipelago.

Large, well-managed, fully protected marine reserves like Revillagigedo are key to rebuilding species abundance and diversity and protecting the overall health of the environment.

**Learn more about Revillagigedo and its spectacular marine life at**  
[pewtrusts.org/Revillagigedo](http://pewtrusts.org/Revillagigedo)



# Editorial

---

Just over a year ago, we created the CODEMAR (for its initials in Spanish) which is the Coalition for the Defense of the Seas. Our main goal was –and still is– to join efforts to reinforce the protection of the Mexican marine ecosystems and the species that live in them, as well as regulate the fishing industry activity and toughen up sanctions for those who plunder its natural resources.

The challenges encountered have been many, because historically seas in Mexico have been relegated from the national environmental agenda. However, today we are certain that although there is still much to be done, in the last few months some effective measures for marine conservation have been taken, the most successful and hopeful example being the creation of the Revillagigedo National Park.

As members of CODEMAR and as Mexicans, we celebrate this decree, which signals the beginning of a new era regarding the creation of new Marine Protected Areas (MPA) free of fishing. Undoubtedly, it is triumph for our country.

The publication of this special edition of *Equilibrio* seeks to recognize and celebrate the creation of this MPA, the biggest one in North America where any type of fishing is banned.

Through these pages, we also seek to prompt our readers to think about and act upon these issues, because we can all contribute to the conservation of oceans; regardless of how far away we live from the seaside. Our consumer habits are fundamental for this cause.

Lastly, we would like to thank those who have supported us: media, nature photographers, scientists, tourism services suppliers, academia, private sector and members of the society. Of course, we thank the Ministry of Environment and Natural Resources (SEMARNAT), the National Commission of Natural Protected Areas (CONANP), the Navy (SEMAR) and the rest of the authorities that supported us. Our special thanks to the Pew Bertarelli Ocean Legacy.

We corroborate our commitment to the Mexican seas. We will keep striving to protect their riches.

## The Editors

---

*Equilibrio* is a publication produced by Beta Diversidad A.C, Monte Athos 414 - 4, Lomas de Chapultepec, ZC. 11000, Miguel Hidalgo, Mexico City. Responsible editor: Mario Gómez.

The opinions expressed on this edition are not necessarily shared by all the editors and are the sole responsibility of the person who expresses them.

*Equilibrio* had a print run 70 000 copies; 60 000 were part of the Reforma newspaper subscribers edition and 10 000 additional copies are on controlled circulation.

# Content

**5**  
Hope for the world



**8**  
Protected marine areas and sustainable exploitation of the oceans

**14**  
A threatened ocean



**18**  
Tourism versus fishing in MPA

**20**  
**Marine parks:**  
natural shields against climate change



**26**  
One tenth free of fishing



“The best legacy a human being can leave to its children is a well preserved planet to live in”  
**Interview with Rafael Pacchiano**



**40**  
One single ocean  
**Interview with Alejandro del Mazo**



**43**  
United will triumph



**50**  
In the heart of every sailor

## Directory

### MEMBERS OF THE COALITION IN DEFENSE OF THE SEAS OF MEXICO (CODEMAR)

Amaya Bernárdez  
Ramón Castellanos  
Mario Gómez  
Fasha Piña  
Gabriel Quadri  
Nora Torres  
Francisco Ursúa

### GRAPHIC DESIGN AND WEB PROGRAMMING

Erick Schoener

### LEGAL

Ana Luisa Gallardo

### ADMINISTRATION

Itzamna Pacheco



“The creation of the  
**REVILLAGIGEDO**  
National Park is hope for the seas  
in Mexico, and in the entire world”

Sylvia Earle. Mexico, 2017



**CONTACT US!**



 @defensademares  
 @endefensadelosmares  
 /En defensa de los mares

contacto@endefensadelosmares.org  
[www.endefensadelosmares.org](http://www.endefensadelosmares.org)

# The ocean's **fair value**

By Amaya Bernárdez de la Granja | @amayabernardez



**The economic value of the oceans is 24 trillion dollars (roughly one third of the world's GDP, which is 75.5 trillion dollars).**

**T**he services that ecosystems provide are not quantified in terms comparable to other economic services, and unfortunately, as a result, the policies for their use and preservation are sometimes underestimated and minimized.

Considering that environmental services contribute decisively to the wellbeing of the population, we ought to grant them their fair value and importance, and the same applies to the natural capital that generates them. Therefore, the relevance of quantifying environmental services in economic terms, to widen the information base and induce wise policy design and rational decision making.

It is important to clarify that most of the intrinsic uses and properties of environmental services are intangible and out of the scope of traditional economic markets, for example: biodiversity, landscape, carbon dioxide capture and protection against coastal disasters, among others. However, the latter have great, if not the greatest importance when it comes to the economic valuation of ecosystems.

Despite the difficulty of applying accurate methodologies, and the complexity of environmental processes, there are more studies each day that try to estimate the total economic value of the planet's most relevant ecosystems, and the ecological services associated to them. These studies are a first attempt to make their potential value evident, and link it to further analysis of the physical and biological processes and the value these such processes have for human wellbeing.

It is worth mentioning one of the most recent studies developed by the World Wildlife Fund (wwf) in 2015: *Revival Ocean Economy Report*, which presents impressive figures regarding the economic value of biological systems and a solid classification for them and their environmental services. The report considers the rough economic value of the oceans to be 24 trillion dollars, and includes estimates of their direct productivity, for example: coastal and transoceanic transport, tourism, environmental education and carbon capture.

If we compare the above figure to the global GDP in 2016, which according to the World Bank was 75.5 trillion dollars, we realize its immensity.

It is important to highlight that most of the value allocated corresponds to environmental services which are out of the scope of traditional economic markets,

for example, regulation of the gas balance, regulation of natural disturbances, waste processing and disintegration and nutrients cycle. Only the fundamental role seagrass plays as a sand and sediment retainer is worth 2.5 trillion dollars a year— according to the same wwf study— which is more than the GDP of many developing countries.

We must underline the supremacy of marine ecosystems above land ecosystems, not only because they account for three quarters of the planet, but also in terms of the services and resources they provide for human wellbeing. Undoubtedly, this explains the millenary trend to live off the oceans' shores. It is difficult to conceive the history of mankind without the oceans and their role in communications.

In Mexico, seas are forgotten. There are several reasons for this, but mainly it is a cultural issue, they always come last, compared to their land counterpart, and this applies both for public policy making and resources conservation.

Perhaps historically we have minimized their importance and therefore we do not resolve their issues as required. And yet, it is urgent to resolve them because the lack of strict fishing regulation, a marine legal system and the scarce conservation actions, are destroying (with license) vast portions of the continental platform and a variety of marine resources. Hence, it is our duty to foster vital actions for the protection and the conservation not only of the Mexican seas, but of the seas of the entire planet.

## — ABOUT THE AUTHOR

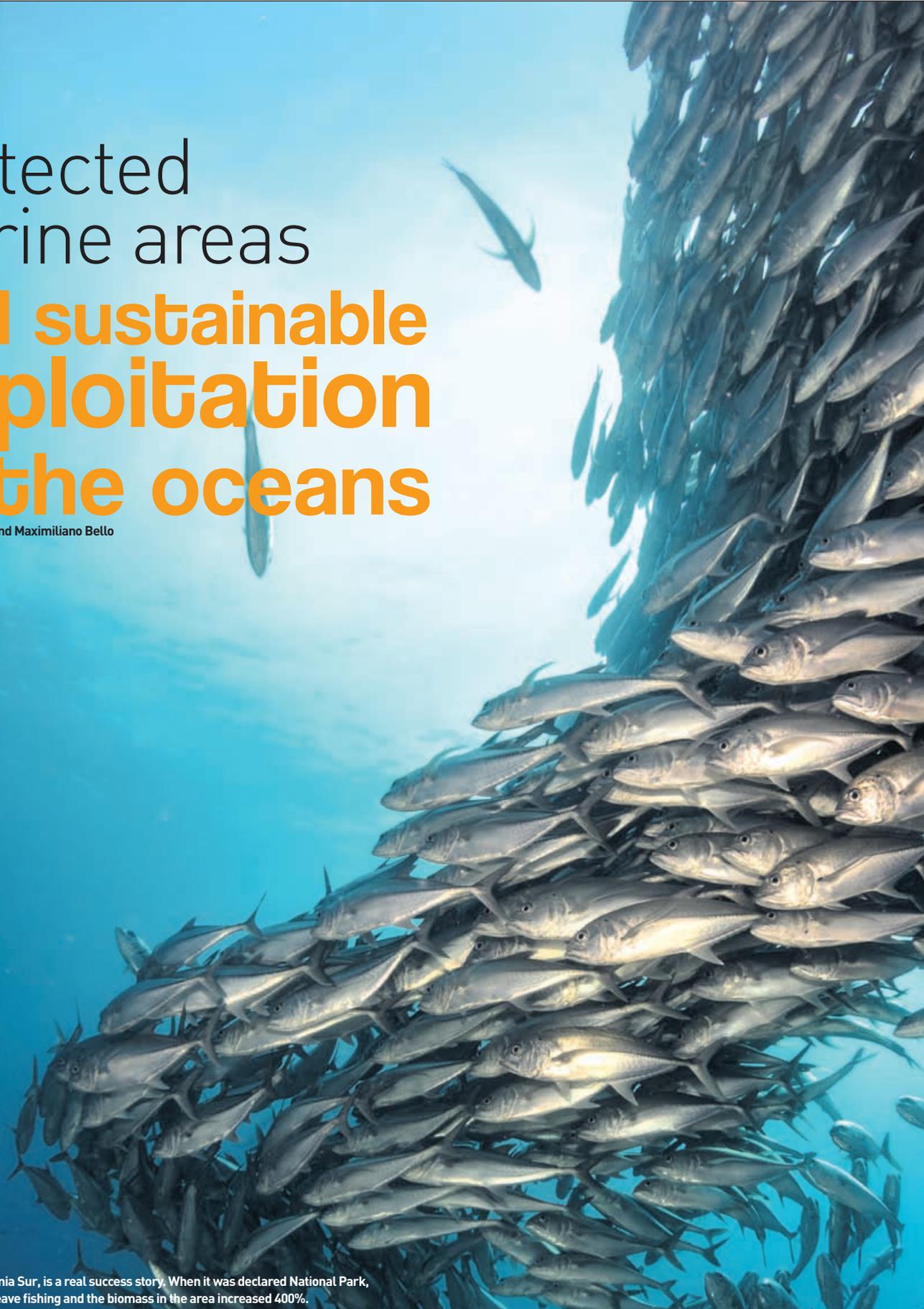
**She was Chief Advisor at the National Commission for Natural Protected Areas (Conanp for its initials in Spanish), General Director for Citizen Participation at the Department of Homeland Security and Director of Governance at the Miguel Hidalgo Municipality in Mexico City.**

**Over 20 years, she has developed a vast experience in reef ecology, conservation tourism, creation of protected natural areas, social consensus and negotiation. She is currently General Director for Sociedad Informada, A.C.**

# Protected marine areas and sustainable exploitation of the oceans

By Luis Villanueva and Maximiliano Bello

Cabo Pulmo in Baja California Sur, is a real success story. When it was declared National Park, its inhabitants decided to leave fishing and the biomass in the area increased 400%.





**B**y 2050, the world population will reach just over 9 500 million people. It is estimated that this growth will be accompanied by an increase in food demand of more than 70%. As it is expected, the demand for ocean products will follow suit, but considering the incentives provided by the institutions that regulate the fishing activity in many countries, ensuring supply continuity will only be possible if we start to use the marine resources responsibly.

Undoubtedly, the biggest challenge for ocean conservation is overfishing. Since 1996, year in which the global fishing production reached its historic maximum level with 86.4 million metric tons extracted from the ocean, the global capture production has decreased consistently and so has the number of fisheries at their maximum sustainable level. According to the United Nations Food and Agricultural Organization (FAO), while in 1974 nearly 90% of the fisheries operated within sustainable exploitation levels, in 2013 only 68% did. That same year, over 31% of the world's fisheries were over-exploited. Note that that same year, 58% of the fisheries were at their maximum sustainable level, which means that increases in the fishing effort could have led to future overexploitation.

The traditional fishing regulatory institutions contribute to ocean overexploitation mainly because they were founded under the paradigm of the infinite abundance of the marine resources. From an international perspective, the United Nations Convention on the Law of the Sea establishes that the territorial sea for nations spreads 12 nautical miles around their coasts, while its exclusive economic zone spreads over 200 nautical miles. Hence, close to 40% of the total ocean surface, approximately 130 million square kilometers, is out of the jurisdiction of any nation. This territory is known as "open sea", and there occurs a phenomenon known as the "The Tragedy of the Commons", whereby the free access to resources creates individ-

ual incentives to overexploit them and maximize earnings today, even though this compromises the future interests of those whose livelihood comes from the sea.

"The Tragedy of the Commons" also occurs within the territorial seas and waters under the jurisdiction of those countries where there is still "free access" for fishing or where the monitor and control systems are deficient, encouraging illegal fishing, which is estimated to account for a third of the total global capture.

In many countries, this practice has deepened because of government programs. For instance, places where subsidies are granted to purchase fuels and each day more efficient fishing equipment, foster overexploitation. This is mainly because these subsidies have contributed to increase the extraction capacity of marine resources worldwide. It is estimated that today there are more than 4.6 million fishing boats whose extraction capacity (per time unit) is greater than what the ocean can offer sustainably. This means that today we can fish at a faster rate than the time it takes the ocean to replace the resources.

In this respect, we are going through a decisive moment in terms of public policy making for oceans conservation. On the one hand, we have a dynamic where a lot of boats are after fewer fish, which consequently causes overexploitation of other species. On the other hand, we face an accelerated increase in food demand, which means that if there is not a profound change in the way we think and utilize marine resources, the overexploitation trend will only go up.

The above would happen because shortage of any good increases its price as well as the expected sale earnings. For the case of marine products, there is an overwhelming example: in January 2017, the first bluefin tuna of the season (bluefin tuna faces imminent extinction danger) weighed 212 kilos and was sold at the Tokyo market for \$860 000 dollars, \$4 057 dollars per kilo.

— THE SOLUTION TO THE OVERFISHING CHALLENGE IS NOT ONE SINGLE THING

To revert overfishing it is necessary to:

**a)** Establish vast ocean reserves (with a total fishing ban), to slow down the decline of the fish populations and protect key ecosystems for their survival, as well as the survival of the great ocean biodiversity.

**b)** Modify the institutions that regulate fishing as well as the fishing management systems in conjunction with all the stakeholders: fishermen, government and other users of the marine resources, to reach sustainable exploitation levels.

**c)** Do it as soon as possible.



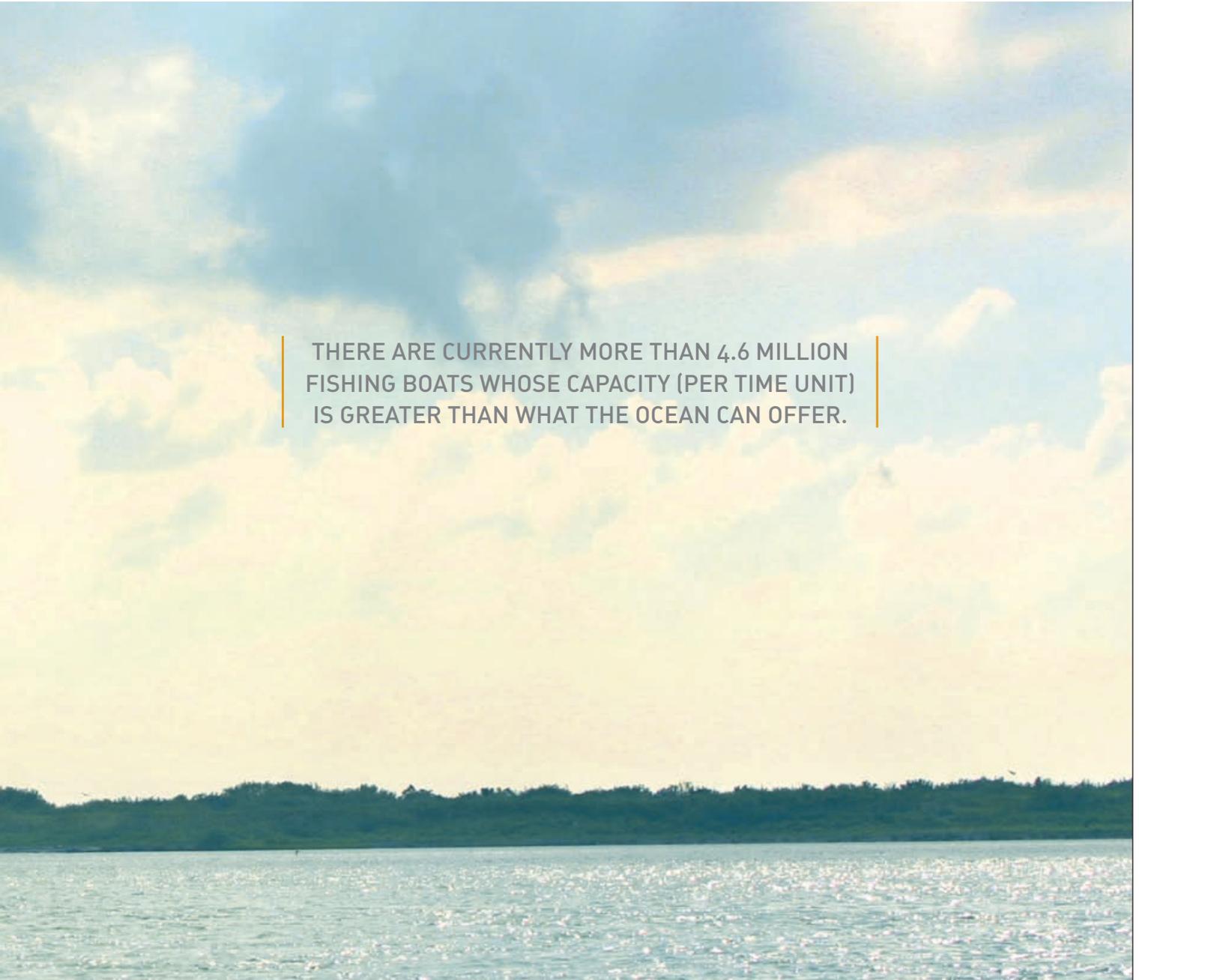
The last condition is the one that causes the greatest concern among scientists and public policy makers. This is because it is not possible to shift a paradigm overnight, it requires time, a lot of team work and trust in the expected results. It is about changing policies and the institutions that regulate the extraction of marine resources, sometimes sacrificing current benefits to secure future ones.

#### — **ROLE OF PROTECTED MARINE AREAS AND MARINE RESERVES**

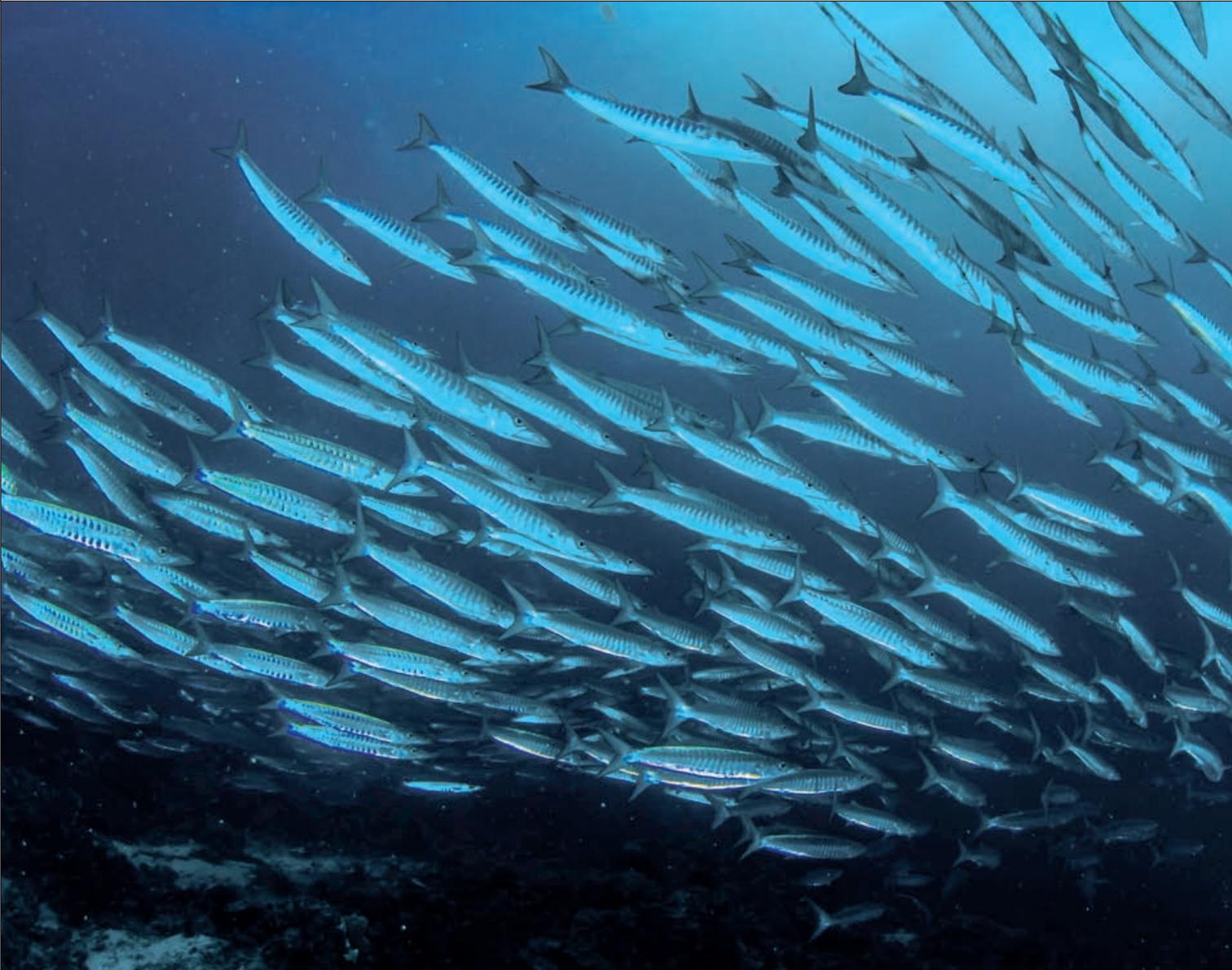
Today, just over 3% of the total ocean area is under some sort of protection, which would

not be enough to guarantee the survival of the ecosystems and vital marine species. However, in the last few years, the world has seen an increase in the protected marine surface.

This increase is mainly the result of the agreements reached at the Conference of the Parties 10 (COP 10) as part of UN Convention on Biological Diversity, which took place in Nagoya, Japan, and where 168 countries agreed to protect 10% of the coastal zones and marine areas of their countries by 2020. It is also the result of adopting the UN Sustainable Development Goals, estab-



THERE ARE CURRENTLY MORE THAN 4.6 MILLION FISHING BOATS WHOSE CAPACITY (PER TIME UNIT) IS GREATER THAN WHAT THE OCEAN CAN OFFER.



lished in 2015, specifically Goal 14 which is related to conservation and sustainable use of the marine resources.

#### — HOW DO THEY HELP?

Protected marine areas are well established conservation instruments, based on scientific knowledge, and commonly used to fight biodiversity losses and stimulate the growth of marine species populations that have suffered some degree of overexploitation.

Science indicates that protected areas can provide a variety of additional benefits, including reducing the impact of the effects of climate change. However, not all the protected areas are the same, and the benefits they offer depend heavily on the protection level chosen for them. There are three com-

monly used protection categories for marine areas: “thoroughly protected” or “marine reserves”, “heavily protected” and “barely protected”. The “thoroughly protected” or “marine reserves” offer the most benefits and the best results in terms of conservation.

Specifically, the marine reserves which are thoroughly protected, in remote locations, vast in size, older than 10 years, with an extraction ban and heavy controls and monitoring by the authorities, are the areas that offer the greatest ecological benefits. The marine reserves where there is a total extraction ban (“no fishing zones”) have double the number of large fish species, five times greater biomass of large fish, and 14 times greater biomass of sharks, compared to those areas where fishing is permitted. In addition to this, fish populations within marine reserves have a greater probability to provide adult fish and larvae outside the boundaries of the reserve. The most vulnerable coral reefs recover faster,

which aids the recovery of the herbivore fish populations. At the same time, large marine predators such as sharks and billfish also recover faster.

A global summary of 124 reserves worldwide, where there is an extraction ban, found that in general fish presence is up (by 166%), there are more larger fish (28% more), there is greater fish biodiversity (21% more species), and there is greater biomass (446% up). Additionally, these areas improve the ocean's ability to capture carbon, reducing the effects of ocean acidification and provide climate change resilience.

Likewise, marine reserves have proven to be conservation tools with enormous benefits for migratory species that use them as temporary habits or to reproduce, winter, feed or give birth to their offspring. They are also beneficial for species which are important for the health of the ecosystems. There are indicators that show that networks of marine reserves, together with fishing management tools, can contribute to the recovery and conservation of species with high commercial value.

Additionally, marine reserves are also magnets for marine ecotourism, an industry that has grown significantly over time, as well as being an important source of employment generation and revenue capture. Only in Mexico, close to 900 000 tourists interested in marine ecotourism visit the Baja California Peninsula every year, bringing in a total income close to 500 million dollars.

Mexico is also home of one of the most successful marine reserves globally: Cabo Pulmo in Baja California Sur. It is a community that used its adjacent marine area for fishing. Excessive fishing caused a steep decline of the fish populations of the area, and with it came a decline to the community's income.

In the light of this challenge, the team work within the community, civil organizations, academia and government resulted in the declaration of the area as National Park, where only fishing for self-supply was permitted. However, the Cabo Pulmo Community chose not to fish and dedicate themselves to activities related to marine ecotourism. It was a difficult choice, but the community assures it was the right one.

In 2016, Cabo Pulmo received over 30 000 scuba divers, registered biomass levels 400% up compared to when it was a fishing commu-

**THE MARINE RESERVES WHERE THERE IS A TOTAL EXTRACTION BAN HAVE DOUBLE THE NUMBER OF LARGE FISH SPECIES, FIVE TIMES GREATER BIOMASS OF LARGE FISH, AND 14 TIMES GREATER BIOMASS OF SHARKS, COMPARED TO THOSE AREAS WHERE FISHING IS PERMITTED.**

nity and an income several times higher than the income obtained from the fishing activity. Most importantly, the community found a way of living that is sustainable over time and that contributes to ocean conservation.

The announcement of the creation of the marine reserve at the Revillagigedo National Park is a very important reason to celebrate in Mexico. Not only it complies anticipatedly with international commitments, but it is also the first step towards the creation of marine reserve networks and fishing refuges, capable of keeping the immense biodiversity of our country, of fostering the health of key ecosystems to guarantee the food supply for future generations of Mexicans and of creating jobs and wealth.

**Congratulations Mexico!**

## — ABOUT THE AUTHORS

**Luis Villanueva is a consultant for the project PEW-Bertarelli for Ocean Legacy; he coordinated marine conservation initiatives between Mexico, Cuba and the United States.**

**Maximiliano Bello is the first official of the international conservation unit of The Pew Charitable Trusts, and is also adviser for the Oceans Legacy Project.**

# A threatened ocean

By Augusto Macías | @bdemontork

THE AMOUNT OF PLASTIC WASTE IN THE OCEAN IS EQUIVALENT TO OVER  
**32 000 PIECES**  
PER SQUARE KILOMETER.

EACH YEAR, THIS WASTE IS RESPONSIBLE FOR THE DEATH OF  
**100 000**  
MARINE MAMMALS AND  
**1 million**  
BIRDS.

THE OCEANIC DEAD ZONES (AREAS WHERE OXYGEN LEVELS ARE VERY LOW OR NIL) ACCOUNT FOR OVER  
**245 000 km<sup>2</sup>**  
(SURFACE ROUGHLY EQUIVALENT TO THE AREA OF THE UNITED KINGDOM).

IN 2015, THE CAPTURE OF FISH AND SHELLFISH REACHED  
**81 millions**  
TONS;  
**1.4%**  
MORE THAN THE PREVIOUS YEAR.

MINING ACTIVITIES IN THE OCEAN ARE GOING UP. IT IS ESTIMATED THAT THERE ARE AROUND  
**7 000 tons**  
OF MANGANESE AND ITS EXPLOITATION IS SOUGHT.

UP TO **80%** OF THE CAPTURE BY SOME FISHING COMPANIES INCLUDE MAMMALS, BIRDS AND OTHER SPECIES WHICH ARE SACRIFICED AND THROWN BACK INTO THE SEA. THIS IS KNOWN AS  
**'incidental fishing'**.

Despite its name, our planet is mainly water, distributed in various oceans that shelter more life than we know of and provide us with food and oxygen. However, marine ecosystems are more and more affected each day by threats that are mainly man made.

IN THE LAST  
**150 years**  
OCEAN ACIDITY HAS  
INCREASED BY  
**30%.**

THOSE AFFECTED BY A REFINED  
OIL SPILL TAKE OVER  
**10 years.**  
TO RECOVER.

MARINE ECOSYSTEMS  
AFFECTED BY A  
CRUDE OIL SPILL TAKE  
APPROXIMATELY  
**three years**  
TO RECOVER.

ONE CUBIC METER  
OF OIL  
**(1000 liters)**  
FORMS A SPILL WITH A  
DIAMETER OF  
**100 km.**

DUE TO HUMAN  
ACTIVITIES, THE SEA  
LEVEL CURRENTLY  
RISES ABOUT  
**3.2**  
**millimeters**  
EACH YEAR.

**There are five oceans. Three major ones and two minor ones:** Pacific, Atlantic, Indian, Antarctic and Arctic respectively.

- The **Pacific Ocean** is the largest ocean, with an area over **150 million km<sup>2</sup>**.
- Oceans cover a total area of around **350 million km<sup>2</sup>**, which accounts for **70%** of the planet's surface.
- It is estimated that the total volume of ocean water is more than to **1 300 million km<sup>3</sup>**. Each cubic kilometer accounts for 1 million million liters of water.
- If **water was extracted from the Earth**, the planet's size would be one third of the moon.
- The terms **"sea" and "ocean"** are used indistinctly, as synonyms. But they are not: oceans are larger and deeper than seas.

# BLUE

# REVOLUTION

## THE CONSERVATION OF THE OCEANS

By Mario Gómez | @Mariogomez

**D**uring the 50s in Mexico, president Adolfo Ruiz Cortines launched the strategy “March to the Sea”, and decided to move from farming to fishing, to diversify food sources, imitating the initiative other countries were carrying out, called the “Blue Revolution”. It was then when institutions with a total lack of vision or planning were created; the concept of sustainability was non-existent, and the objective was to fish the most you can for today because there will be no more left for tomorrow, emulating Garret Hardin’s “Tragedy of the Common”, without considering that the ocean has a fragile structure and any unbalance affects its functioning immediately. This situation has prevailed up until now, affecting all the marine species, whose populations are collapsed to dramatic levels.

Our country invested then in fishing infrastructure and created institutions to implement and operate the strategy. It all started in the Gulf of Mexico, where in a 20-year period its then abundant fisheries were decimated for the capital voracity. They disappeared gradually —without us noticing— species that are rich food sources such as the red snapper, sea bass, grouper and tuna, as well as sport fishing species such as the tarpon, mahi-mahi and sailfish; the absence of sharks was made evident too, and bivalve species such as clams, oysters and even snails.

Most of marine resources have collapsed to levels of up to 80 or 90% of their original populations; this vertiginous exploitation of the biodiversity in the Gulf of Mexico forced the “fishing effort” to move to the Pacific, to keep up the merciless annihilation, and most importantly, with

no economic gain for Mexico. Fishing today represents for Mexico less than .06% of the national GDP.

In the past few years, the impact to our last marine reserve, the Gulf of California, also known as Sea of Cortez, has exacerbated; the excessive sardine fishing, a species that is key for feeding other pelagic fish, has almost vanished in a very short period. The United States and Canada have declared a sardine fishing ban, while in Mexico, the National Commission for Aquaculture and Fishing is still issuing permits to fish it.

In the middle of the Sea of Cortez, we can find Isla Rasa, a very small island that hosts two bird species that are key indicators of the state of health of the ecosystem: the elegant tern (*Thalasseus elegans*) that flies in from Peru, Ecuador and Chile to nest in the months of June and July, and the Mexican seagull (*Ploma Larus heermanni*). The nesting of both species has been compromised in up to 70% in the last years because of the absence of their food sources (sardine and anchovy), which have diminished because of the sardine fleets; sardine and anchovy are turned into dog and chicken food, when it is us Mexican, specially our younger population, who should be taking advantage of this high nutritional value protein.

When a feeding frenzy is observed in the ocean, it is a clear sign that something important is happening underneath, and that that sea is healthy, and the food chain has not been compromised. A feeding frenzy is observed when sea birds —such as pelicans or frigate birds— overfly a school of sardines or anchovies. The birds dive into the group of fish and divide the school, eating one fish at a time, dolphins, that are the first to spot the school, push it upwards and the birds join the feast, but below the school, tunas, marlins, sea lions and sharks come along. All work together synchronically to isolate the sardines that feed the bigger fish. Everything is connected, mysteriously connected, in the fragile network of ecological balance.

If there are no forage fish, like sardines and anchovies, other fish, known as pelagic, will disappear. Sardines and anchovies get to the Sea of Cortez following the California Ocean Current, which comes from the Artic and whose waters transport huge quantities of nutrients that these species feed on. But the forage fish are intercepted by Mexican sardine boats in the North Pacific and populations are decimated, because these boats are equipped with the latest technology and there is no way of escaping their cast nets, where sharks, turtles, rays and birds also get caught.

Today the famous diver Jacques-Yves Cousteau would be weeping if he knew that the Gulf of California, which he called the "The Aquarium of the World" in the late 80s, has turned into a "Marine Grave" in just 20 years.

The National Commission for Aquaculture and Fishing (CONAPESCA for its initials in Spanish), institution that is part of the Department of Agriculture, Resources and Fishing (SAGARPA), has the legal mandate to manage the seas in Mexico, but has been totally inefficient in doing so and has played judge and jury in many decisions, destroying the patrimony that belongs to all Mexicans, but up until now, has only been used by those lacking sustainability vision, who fish marine species that cannot recover and complete their reproductive cycle.

The sea laws are designed for fishing and fishermen, who have joined the authorities to exterminate the Mexican Seas and our natural capital, which they call product and which the law should recognize as wildlife.

In 2009 in Aichi, Japan, we acquired a binding commitment, together with other countries, to preserve and have a fishing exclusion in at least 10% of our marine territory. Now, with the creation of the Revillagigedo National Park, Mexico barely reaches 4.7% of our marine territory, and we must pursue and meet this objective to guarantee the conservation of our seas, not just for fishermen, but for all Mexicans.

There is still the economic opportunity Conservation Tourism offers, like the Galapagos in Ecuador, Coco Island in Costa Rica, Malpelo in Colombia and Coiba in Panamá, clear examples of what this activity can bring in.

The Coalition for the Defense of the Mexican Seas (CODEMAR) is working on a strategy that considers the creation of a system of Marine Protected Areas with now take zone, and for that purpose, it must pursue the issuing of decrees for these MPA in strategic marine ecosystems; equally, it is working on the creation of the Fund for the Mexican Seas (FOMARES) that will be the instrument to funnel the financial resources for the operation and protection of the public resources that marine ecosystems shelter.

It is imperative to change the vision of the fishing sector, it is urgent that they start viewing marine resources, not fishing resources, so they can move to the correct track, the track that will guarantee our food supply in the long run and the sustainability of the oceans in Mexico. It is also urgent to have a structural change in CONAPESCA, which now obstructs this vision, and we must involve the Department of Environment and Natural Resources (SEMARNAT) in this new challenge, to guarantee an adequate balance. The regulatory functions must be transferred to SEMARNAT and the National Fishing Institute (INAPESCA) as well as the Marine Ecology Institute. Also, key aspects of the Law for the Sea and Law for Fishing must be modified.

**Let us start now the real Blue Revolution, the Conservation of the Oceans in Mexico.**

#### **ABOUT THE AUTHOR**

Over 20 years, he has implemented successfully environmental projects in Mexico, both in the private and public sectors. From 1997 to 2000, he was part of the team which created the National Commission for Natural Protected Areas (CONANP). He has promoted and managed the declaration of different areas as natural protected areas, at a federal, state and municipal levels.



# TOURISM VERSUS FISHING IN MARINE PROTECTED AREAS (MPA): THE DILEMMA BETWEEN ENVIRONMENT PROTECTION AND DEVELOPMENT

By Francisco Ursúa Guerrero | @Chilasmx

In recent years, the academia as well as the government, have put on the table the discussion about the advantages of developing tourism versus fishing in our country's Marine Protected Areas (MPA). Considering that these areas are zones where the environment has not been altered by human activity or are areas that require preservation or restoration, it is worth analyzing the mechanisms in which both activities (fishing and tourism) influence the conservation of our natural heritage.

## NATURE TOURISM? MINIMAL IMPACT ENVIRONMENTAL TOURISM? IS IT POSSIBLE TO DO IT WITHOUT AFFECTING THE VISITING SITES?

Understood as a tourism that does not modify the natural conditions of the site, does not exceed the capacity of ecosystems, communicates to visitors the intrinsic values of the area and the need to preserve it, only uses small portions of the PNA, in controlled, spaced, schedules, preferably avoiding the use of motor vehicles and without building any infrastructure, yes, it is possible, in theory, although sometimes difficult in practice. A successful option for this is of course independent scuba diving, which occurs in certain privileged sites of our oceans.

There are well documented examples that these tourism activities have tints of environmental sustainability, after a few decades of continuous operation. Such is the case of the Mesoamerican Reef System in certain portions of the Mexican Caribbean, off the coast of Quintana Roo (Cozumel and Sian Ka'an); or the case of Cape Pulmo in the Baja California Peninsula, where the shift from fishing activities to tourism activities has laid the foundations for successful community development, as stakeholders themselves mention. In these MPA, the years training tourism operator, the conscience shift of the new generations and the pressure from national and international visitors, have had as a result a noticeable boom in local economies and the environment that supports them.

## FISHING IN MARINE PROTECTED AREAS (MPA)? IS IT COMPATIBLE WITH THE CONSERVATION OBJECTIVES?

Fishing is an activity that by nature implies extraction of wildlife; however, wildlife is understood in legal terms, as well as in the predating logic of many sectors of the industry and government, as fishing resources. There is a permanent conflict between authorities and users within

protected areas, the conflict derives mainly from the legal controversies found in the regulation of the use of the natural heritage. The issues are complex, and the management of species of commercial value is very difficult, mainly because the Department Agriculture, Resources and Fishing (SAGARPA) and the Department of Environment and Natural Resources (SEMARNAT) seem to be pursuing antagonist objectives: the former oversees the regulation of the fishing sector, focusing on achieving the maximum exploitation of the resources, the latter must guarantee the activities are pursued under a sustainability criterion. Coordination between these two departments is imperative, and the settlement of a new institutional agreement whereby both departments pursue sustainable fishing in our country will be essential to resolve the issues that have contributed to the alarming collapse of the oceans.

Industrial fishermen behave as if they were the owners of vast areas of national territory (seas and coasts), and they exploit the resources mercilessly, taking them to the brink of extinction. Sadly, in Mexico there are no evidences to support that industrial fishing of tuna, shrimp, octopus or lobster has any tint of sustainability, all these species are severely over exploited.

Local fishermen understand that the success of their activity depends on weather patterns, species available, environment, among other factors which they cannot control. Responsible fishermen understand the nature cycles and the specifics of the multiplicity of species: fish, mollusks, algae, corals, sponges and they use them to their advantage, without decimating them. Traditional fishing practices is still possible in small communities, in places that are away from massive coastal Development, even in buffer zones in marine protected areas.

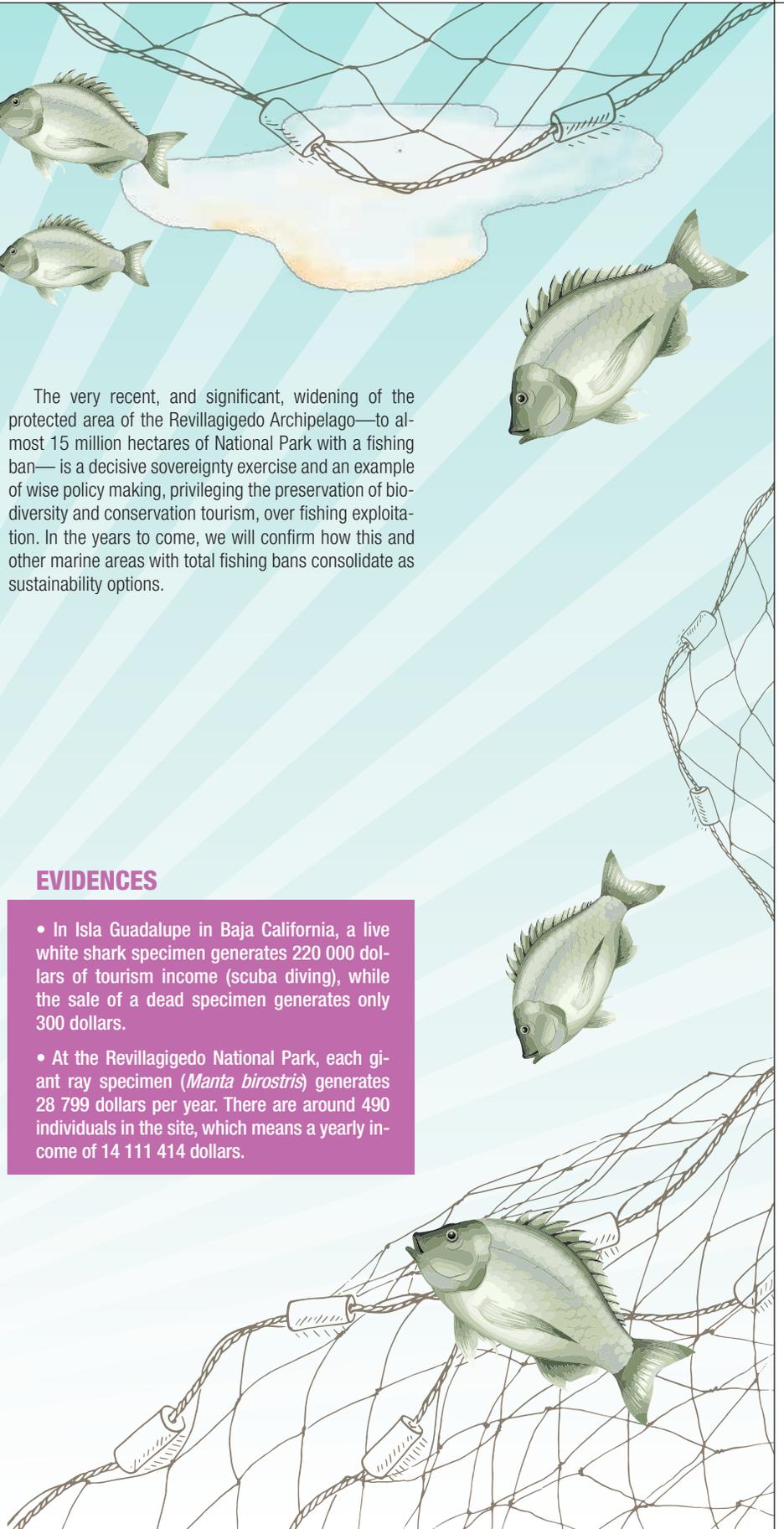
#### ABOUT THE AUTHOR

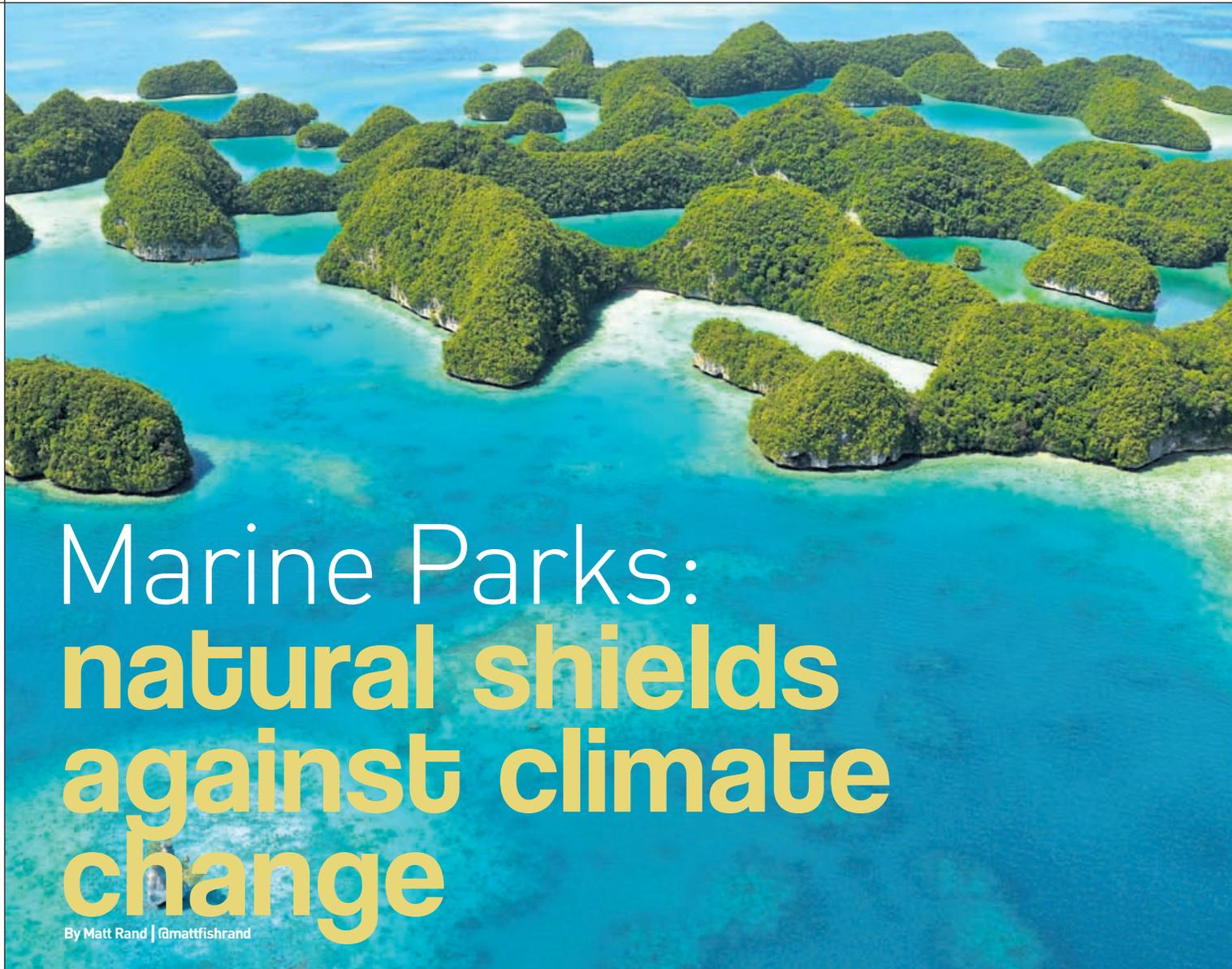
Civil Engineer with an MA in Environmental studies; has worked for 18 years in the management of Natural Protected Areas, first as Deputy Director for Isla Contoy National Park; then as Director for the Isla Mujeres National Park (Cancún) and the Biosphere Reserve of Sian Ka'an; finally, as Regional Director for the Yucatan Peninsula.

The very recent, and significant, widening of the protected area of the Revillagigedo Archipelago—to almost 15 million hectares of National Park with a fishing ban—is a decisive sovereignty exercise and an example of wise policy making, privileging the preservation of biodiversity and conservation tourism, over fishing exploitation. In the years to come, we will confirm how this and other marine areas with total fishing bans consolidate as sustainability options.

#### EVIDENCES

- In Isla Guadalupe in Baja California, a live white shark specimen generates 220 000 dollars of tourism income (scuba diving), while the sale of a dead specimen generates only 300 dollars.
- At the Revillagigedo National Park, each giant ray specimen (*Manta birostris*) generates 28 799 dollars per year. There are around 490 individuals in the site, which means a yearly income of 14 111 414 dollars.





# Marine Parks: natural shields against climate change

By Matt Rand | @mattfishrand

**A recent study shows that the benefits of protected ocean areas extend far beyond marine life and reach out to land communities.**

In recent years, prominent scientists have expressed that the protection of vast sea areas as natural oceanic reserves, bring in the additional benefit of aiding marine life to successfully weather the impacts of climate change.

Support for the above statement appears on several international studies, one of the most important ones is included on the scientific journal *Proceedings of the National Academy of Sciences*, in which researchers from ten institutions—including partners and members of the Scientific Advisory Committee

for the project Legacy for the Oceans by Pew Bertarelli—, concluded that highly protected marine parks have the potential to offer climate resilience benefits. Specifically, they aid oceans and society adapt to five key impacts:

1. Ocean acidification
2. Increased ocean levels
3. Higher intensity storms
4. Shifts in species distribution
5. Lower oxygen productivity and availability

This analysis shows that marine parks can be climate reserves, particularly when they are extensive in size, well managed, maintained throughout several years and clearly regulated in terms of the kind of human activities allowed there.



**TO INCREASE THE RESILIENCE OF MARINE ECOSYSTEMS, SAFEGUARD WILDLIFE, PROTECT ITS ABILITY TO BACKUP FISHERIES, GRANT COASTAL PROTECTION AND OFFER CLEAN, GOOD WATER, IT IS PARAMOUNT TO SPEED UP THE IMPLEMENTATION OF EFFICIENT PROTECTED MARINE AREAS.**

For decades, specialists have promoted the creation of marine parks to serve as refuges for species which face population decrease due to overfishing, pollution, coastal development, among other strains. Tests have proven consistently that protected areas can help strengthen ecosystems and restore biodiversity.

The results of this new study by Doctor Callum Roberts and Doctor Bethan O’Leary, from the University of York in the United Kingdom, highlight the urgent need for governments to implement climate adaptation policies to allow the protection of oceans and the communities that depend on them.

Roberts claims that these findings “show that to increase the resilience of marine ecosystems, safeguard wildlife, protect its ability to backup fisheries, grant coastal protection and offer clean, good water, it is paramount to speed up the implementation of efficient protected marine areas”.

These new discoveries also reinforce the world’s current demands for tougher measures to protect the oceans.

The International Union for Conservation of Nature, in its 2016 World Congress, voted a motion that requests the protection of at least 30% of the oceans by 2030, to avoid grand scale mass extinction of the marine life.

International governments are paying attention to the topic and movements to protect large extensions of oceanic space are increasing by the day. In the last few years, countries have reserved large ocean strips for their protection, including the Palaus waters, the UK overseas territory of the Pitcairn Islands and the Marine National Monument of Papahānaumokuākea, in the northwestern Hawaiian Islands.

World leaders and decision makers, assembled at the UN Oceans Conference, must pay attention to this recently gathered new scientific evidence.

To counteract the combined effects of overfishing, ocean warming and increased acidification, it is necessary to take immediate actions. Up until now, only 3.5% of the oceans have been reserved for their protection and only 1.6% is thoroughly protected, although there is commitment to increase the total protected areas to 10% by 2020. Likewise, it is necessary to increase the thoroughly protected oceanic space, to safeguard the ecosystems and the economic benefits they deliver.

It is well known that marine parks are a profitable, low technology demand strategy for ocean conservation. This study clearly shows that this conservation tool can bring in great benefits, apart to oceanic conservation, on a local, regional and world scale.

The establishment of marine parks can aid slow down the effects of climate change and alleviate some of the expected difficulties such as food supply uncertainty and increased ocean levels. The vast and heavily protected marine reserves can guarantee the future of our oceans for those communities whose livelihood depends on them.

**— ABOUT THE AUTHOR**

**Runs the project Legacy for the Oceans by Pew Bertarelli.**

# The bluefin tuna in the Mexican Pacific

By Ramón Castellanos | @tu3rc45



In 2016, 3 600 tons of bluefin tuna were caught and put in farms for weight gain in Mexico. Photo: Stephane-bdc.

**M**ost fish do not regulate their body temperature, instead, they live where the water temperature is ideal for their functioning. Tunas are an exception to this because they regulate their body temperature, regardless of the water temperature. This form of metabolism raises the body temperature by burning calories through muscular exercise: swimming. Tunas travel in schools of fast and hungry fish, and can go back and forth after their favorite preys, sardines and anchovies, in the cool waters of Japan and North America, and the warm waters of Baja California Sur and the Taipei Sea.

As you can imagine, this predator-prey ratio is highly demanding in terms of energy: to increase the weight of a tuna by 1 kilogram, it is necessary for it to consume 10 kilograms of sardine, because most of the intake is burnt swimming after sardines, which in return burn 90% of their plankton intake escaping from tunas.

Moving to land, the story gets complicated. The Pacific bluefin tuna BFT has been in the Japanese diet for hundreds of generations. It is part of the country's culture and tradition, and it has a special place at the Tokyo market. Today, this tradition is available to millions of people thanks to the dis-



persion of sushi and sashimi to all the big cities in the world. Most of the BFT is sold in auctions at the Tsukiji Fish Market in Tokyo, where all the fish that get there are sold in advance just to fix the price. In 2013, a 221-kilogram BFT specimen, was sold at a record price of \$1.76 million dollars. And here is where things get even more complicated, because the demand for an overexploited population keeps growing, and we have not allowed any time for it to recover.

The BlueFin Tuna (*Thunnus orientalis*) is born on the shallow Asian coasts, between Philippines and Japan. It remains a couple of years close to the land, and it is there where it has been fished traditionally, by hand, using a fishing line and a hook. This fishing effort provides protein to millions of people, and it is at the same time the one that predated the most specimens, because all of them are young, less than three years old.

Those who manage to escape the fishing lines and hooks, start their journey to the open sea in search for food, some young specimens migrate to the coasts of the United States and Mexico to spend two or three years hunting and gaining weight, to then return to Asia to breed. This is if they make it through the purse seines, which catch entire schools of tuna around the Pacific—including their migratory route—and the waters of the Mexican Exclusive Economic Zone.

The fisheries' managers calculate the size of a population through its volume in tons (biomass) and they call it stock or product. This figure is obtained by measuring the ratio between the fishing effort (how many fishing hours) and the caught tons, this is all calculated with a product vision, not a wildlife vision. The difference is not just semantic, it has implications in terms of environmental services. Fish in the sea, besides being the target of the fishing industry, are key elements of the ecosystem and provide services within the trophic chain that connects the continents.

The estimated size of the population of the BFT in 1952 was of 145 000 tons, reaching its peak at 215 000 tons in the 60s. It is currently estimated to be less than 40 000 tons. According to the International Union for the Conservation of Nature, the species is on the Red List of threatened species, under

**FISH IN THE SEA, BESIDES BEING THE TARGET OF THE FISHING INDUSTRY, ARE KEY ELEMENTS OF THE ECOSYSTEM AND PROVIDE SERVICES WITHIN THE TROPHIC CHAIN THAT CONNECTS THE CONTINENTS.**



Tokyo has the biggest wholesale market of fish and shell fish in the world.

the vulnerable category, and the Union considers that its population is overexploited, and that overfishing is still happening.

The catch volume for industrial fishing started being measured in the 50's, and in 1956 it hit a record 40 000 tons. Even though the fishing effort has kept going up since then, and new high technology has been incorporated (helicopters, 3D detectors, seine purses kilometers long and 500 meters depth, fishing boats with capacity to catch and freeze 800 tons in a single trip etc), the catch continues to go down. Bad sign which indicates the constant reduction of the population.

In 2008, 24 507 tons were caught in the Pacific, and in 2014, just 17 065 tons. 81 % of the capture occurs in Asia (Japan, 93 %, South Korea, 5 % and Chinese Taipei, 2 %) and the remaining 19 % of the fishing oc-

curs in North American coasts. Out of the fishing that takes place in North America, 83% is caught by the Mexican boats (purse seiners /farming for exports) and 17 % by American boats (mainly sports fishing).

In Mexico, the BFT industry uses a combined approach for the management of tunas, it captures live specimens in waters of the Exclusive Economic Zone and slowly transports them to big floating farms off the shores of Ensenada, Baja California: tuna farms. These facilities are anchored to the sea bottom, and are generally located near the coast for easier surveillance, transport and management of all other operations. The objective of the farm is to increase the weight and size of the specimens over a period of three to eight months. Cheap food is used for this process (thanks to subsidies) and it is mostly frozen sardines.



What can we do about this? As a country, we should involve the environmental sector and a variety of academic views to make decisions concerning the handling of the species, prioritizing conservation and sustainability based on scientific evidence. We could even propose restrictive measures for the commerce, through the Convention for International Commerce of Endangered Species of Fauna and Flora, of which Mexico is part. As individuals, we must demand to our authorities responsible management of our resources, based on science and prioritizing conservation over exploitation, and stop consuming blue fin tuna and other unsustainable marine products such as industrial shrimp or farm salmon.

## — ABOUT THE AUTHOR

He has more than 20 years experience in diagnosis, planning and application of initiatives related to the conservation of natural resources and sustainability. For 10 years, he was Associated Director for The Vizcaíno Biosphere Reserve (Baja California Sur), where he developed different programs, the following stand out: protection of the grey whale, environmental education, management of the fishing activities within the protected area, recovery of threatened species and sustainable exploitation of the wildlife of the region. He collaborates with Beta Diversidad A.C., since 2004 and has run conservation and sustainable management programs in Los Chimalapas, Oaxaca; Los Tuxtlas, Pico de Orizaba and Otontepec, in Veracruz; Kalakmul and Nuevo Becal, in Campeche. He is currently working on the environmental recovery of 35 counties in the State of Michoacan, and is also part of CODEMAR (Coalition for the Defense of The Seas in Mexico).

Farms are located close to the shores, in shallow waters, therefore the natural dispersion of biological extrusions from the tunas is not optimal, and great quantities of organic nitrogen accumulate in the surrounding sea bottom, particularly downstream. This accumulation could have grave consequences for the biodiversity of the area, and if it persists with no rest intervals, the damage could be long lasting.

According to data from the Department Agriculture, Resources and Fishing, the BFT market in Mexico is dominated by six companies, all of them based in Baja California. Most of the farmed tuna is exported to Japan through Japanese brokers. In 2006, the income generated for the 4 350 tons of tuna produced in our country was 74 million dollars, but these were sold for 714 million dollars to commercial intermediaries in Japan.

### Information sources:

- Red list of Endangered species from the International Union for the Conservation of Nature 2014.
- Sagarpa / Conapesca
- Antonio Díaz de León and Fernando Noriega-Betancourt. "Conservación de Ecosistemas Marinos en México: Hacia la Cumbre Mundial de los Océanos". Senate of the Republic. Mexico, 2017.
- ISC14. Report of the Fourteenth Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean. Taipei, China. 2014.
- ISC14. 2014. Stock Assessment of Pacific Bluefin Tuna. International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean Taipei, China. 2014.



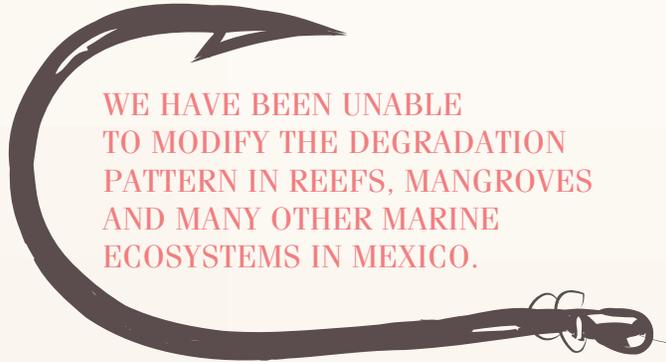
# ONE TENTH FREE OF FISHING

By Octavio Aburto | @octavioaburto

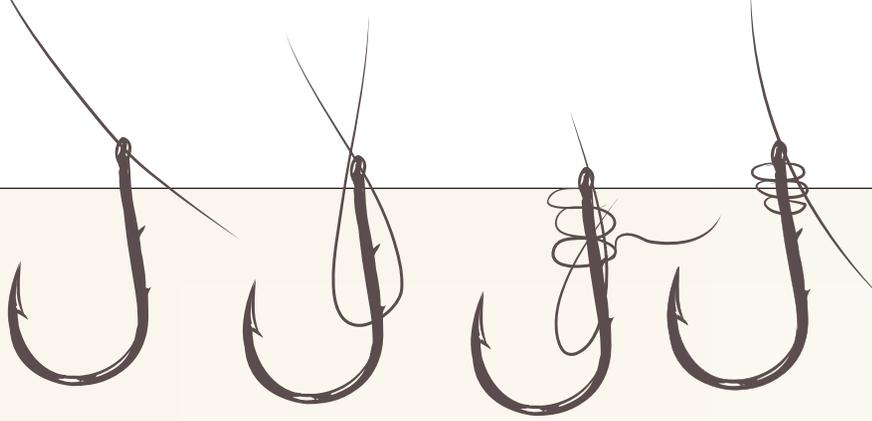


I am coming back from a trip around Baja California Sur, from Punta Abreojos to Bahía Magdalena in the Pacific Ocean, up to Punta Alta and San Evaristo in the San Cosme-Punta Coyote Corridor, in the Gulf of California, and finishing at the Espíritu Santo Island. The trip lasted 15 days, just like the trips I used to do when I was 20 years old and lived in La Paz and dedicated most of my time to research in Marine Biology and Ecology. I have enjoyed the journey as always, but now that I am dedicated to science communication and to document with my camera what happens in the Mexican seas, I see with great concern that we have been unable to modify the degradation pattern in reefs, mangroves and many other marine ecosystems in Mexico.

Just during the last day, I spotted, at least, eight sport fishing boats in one of the mangroves in San Gabriel Bay, in Espíritu Santo, that were fishing small fish to use as live bait. This bay is one of the three bays where any type of fishing is banned, and yet, I did not see any



WE HAVE BEEN UNABLE  
TO MODIFY THE DEGRADATION  
PATTERN IN REEFS, MANGROVES  
AND MANY OTHER MARINE  
ECOSYSTEMS IN MEXICO.



authority trying to stop the illegal fishing, or at least regulating these activities. The sport fishermen were both Mexican and American, but regardless of their nationalities, they fish in mangroves because these are the last places where small sardines can still escape from large sardine fishing boats which have decimated their populations around the whole Gulf of California.

The impact is stronger in years when the water temperature goes up and sardine food diminishes, which decimates its populations. It is in those years where any fishing effort causes havoc, because not only the natural mortality of the specimens is greater, but also fishing intensifies the search for those specimens who have survived and increases exponentially the probability of fishing precisely those sardines.

These valuable sardines cannot escape the huge industrial fishing nets, that not only fish in reefs, because when they cannot find sufficient catch, they move to bays and/or other natural protected areas where it is forbidden by the law to fish. Local fishermen are already complaining about this situation, and it is certain that sport fishermen will soon complain too, but instead of joining forces to end with the overfishing problem caused by industrial fleets, they choose the effortless way out and capture the last sardines that seek refuge in the habitats that nature has provided for the shelter of small and young fish of many species, which by the way are of great commercial relevance. How much longer will it take us to realize that this is wrong? When will we recognize that we cannot fish everything and everywhere, if we are to continue fishing at all?

Twenty-five years ago, I started my scientific research in the Gulf of California, and the challenge was to implement Protected Marine Areas (PMA) as a strategy to recover and protect marine life. The theory says, and we have proved it at a small scale, that if the recovery and protection occur, the benefits on PMA where fishing is banned will reflect on adjacent fisheries. It seems inconsistent, but these fishing free areas act as saving accounts for fishing, while protecting the natural capital on this account (the reproductive fish), the interests generated in time (larvae and young fish that travel around) are used to maintain our fishing economy.

There are very few evidences in the world about these such benefits, which has probably limited the creation of more PMA where fishing is banned. In Mexico, less than 0.5% of the seas are protected against fishing activities. The best documented example of a PMA with a fishing ban is Cabo Pulmo; although the recovery and protection have been a remarkable success, and after 22 years it has shown and shared its results, the fishing sector has never acknowledged that a conservation action is beneficial to them.

After 20 years, and because of the collapse of many fisheries and the pressure put by fishing communities and civil organizations, the fish-

ing administration decided to implement the first “fishing refuges” totally closed to fishing, as part of the management tools that the Mexican fishing law considers for the recovery and management of the fisheries. The objectives and goals of these refuges are, if not identical, very similar to those of the PMA, we could say it is roughly the same.

Although it meant a 20-year struggle to get the fishing administration to accept and implement measures for fishing bans, now more than ever we should encourage them as a strategy to join efforts for the protection of the seas in Mexico.

Just to give a few data points, during my 15-day trip, I visited 11 refuges that were implemented in the San Cosme–Punta Coyote Corridor in 2012. These refuges have increased their biomass 30% more (number and sizes of fish) than those reefs where fishing is still going on, and the biomass measured in tons of fish per hectare has increased by half a ton per year. The biggest refuge, San Marcial (1 km<sup>2</sup>), was the one that recovered the most biomass during this period, and only in 2015 recorded an increase of 400 tons of fish. It is still very small compared to Cabo Pulmo —71 km<sup>2</sup>—, but even with this small size, fishermen have observed profound changes in combers, seabreams and triggerfish, among other species of commercial importance; scientists have estimated significant changes and photographers now have clear evidences that can be shown not only to the society, but to the authorities as well. The Corridor’s communities have submitted to the fishing authorities (CONAPESCA) a 2017-2022 plan that include the following points: 1) leave 10 of the refuges as they are now; 2) the community in Agua Verde wants to double the size of the San Marcial refuge (2 km<sup>2</sup>) and implement a new refuge, the twelfth, with a 26 km<sup>2</sup> area north of the corridor; and, finally, exclude from the corridor industrial sardine and tuna boats, and trawling shrimp boats. If the proposal is accepted, it would be one of the most innovative plans to protect the Mexican seas using tools from the Fishing Law.

In 2010, during the COP 10 Conference in Nagoya, Japan, Mexico adopted the Strategic Plan for Biological Diversity 2011-2020, that contemplated the Aichi Goals for Biological Diversity, including the goal to protect 10% of the oceans from any fishing activity. After all these years in which I have participated as researcher and communicator on ocean conservation, I have realized that what we need to do is modernize the Mexican fishing administration. The fishing sector must contribute to meet the goal that the country set and must stop fishing in at least 10% of the national seas. If this happens, those who depend on fishing will receive the most benefits and, we will obtain the necessary protection for the immense biodiversity that Mexico shelters, most of which is endemic to these wonderful ecosystems.

#### ABOUT THE AUTHOR

PhD from the Center of Marine Biodiversity and Conservation of the Scripps Institution of Oceanography, where he is Associate Professor. He is part of the International League of Photographers for Conservation and founder of Mares Mexicanos.

A manta ray is shown swimming in clear, deep blue water. The ray is positioned in the upper middle of the frame, moving towards the right. The water is very clear, with some light rays visible. The overall tone is a rich, vibrant blue.

REVILLAGIGEDO NATIONAL PARK:

**a privilege  
and a responsibility  
for Mexico**

---



Photo: Benito Sánchez Rojo

Mexicans are fortunate because, among other things, the national territory is in one of the most diverse and unique marine paradises of the entire Pacific Ocean—and the world—. Mexicans are also responsible to guarantee the conservation and surveillance at perpetuity of this new National Park, the largest in North America with a fishing ban. It is a team effort that requires the participation not only of the citizens, but also of the authorities, academia, scientists, tourism operators, visitors, and of course, the fishing industry.

**We have in our hands the unprecedented opportunity to become international leaders in marine conservation.**

**D**uring the declaration process, there was some controversy regarding the surface extension of the polygon; however, the final protected area coincides with the recommendation the UNESCO made to the Mexican government to widen the conservation of the site—declared World Heritage—to a radius of 40 nautical miles around the islands.

“By widening the protected surface at Revillagigedo, we are protecting the existing submarine paths among the four islands, which are used by all the species to feed and breed. With this new connectivity, we are providing the animals with a great comfort zone”, explains the marine biologist Arturo Ayala Bocos.

And, although since 2008 the islands already had the Biosphere Reserve status that safeguarded the 4 islands and a small portion of surrounding waters, it was imperative for our country to extend the protected zone and toughen the conservation measures. As a result, today, 23 years later, the Revillagigedo National Park is an example of oceanic protection.

## THE ABUNDANCE OF SHARKS IS THE HIGHEST IN ALL OF NORTH AMERICA

### — THE “BLUE ROOM”

What makes the Revillagigedo Islands so special? The direct answer is: their location and natural riches, or, as Ayala Bocos says, because it is a big “blue room” in the middle of the Pacific Ocean. Two great sea currents converge there: The Northeastern Pacific, with tepid or cool water, highly productive, that is moved to the south by the California Current; and the Eastern Tropical Pacific, with warm and light water.

The above characteristics make these waters abundant in extraordinary biodiversity; many marine mammals find in this region their ideal habitat, for example dolphins, orcas, sperm whales, blue whales and Cuvier’s beaked whales. These

THE DIVERSITY AND VARIETY OF FISH OF REVILLAGIGEDO REPRESENTS 13.2% OUT OF THE EXISTING TOTAL IN MEXICO AND INCLUDES SPECIES THAT CANNOT BE FOUND IN ANY OTHER LITTORAL OF THE COUNTRY.



Roca Partida. / Photo: Benito Sánchez Rojo

islands are unique because they host a winter population of humpback whales (*Megaptera novaeangliae*) from the North Pacific, that travel in the summer to Alaska and the Aleutian Islands, bordering the Bering Stretch.

The diversity and variety of fish of this place represents 13.2% out of the existing total in Mexico and includes species that cannot be found in any other littoral of the country, from endemic species to species with transpacific and oceanic affinity.

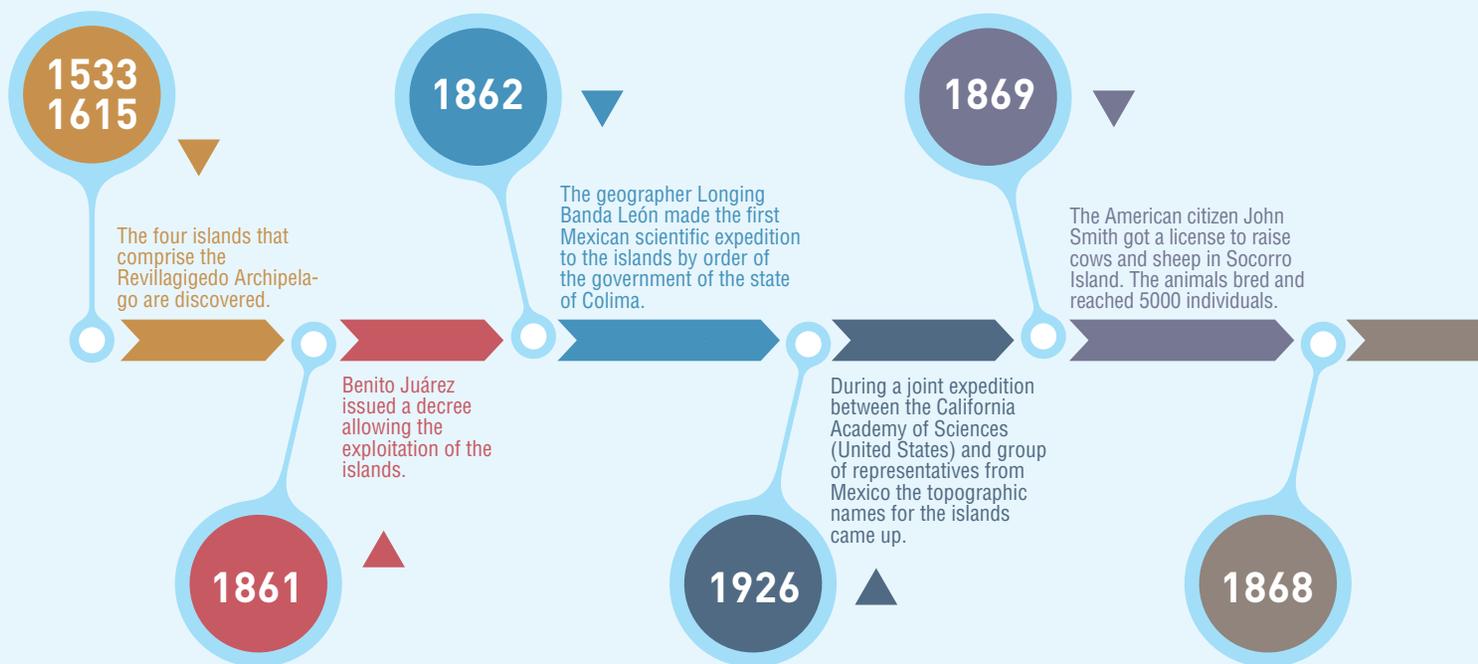
The biomass of the islands is comparable to the biomasses reported in other marine reserves, and larger than in 99% of the world's reefs. For example, the fish biomass in Roca Partida Island is one of the largest in the world, second after the Darwin and Wolf Islands in the Galapagos Marine Reserve, and comparable to the Coco Island in Costa Rica.

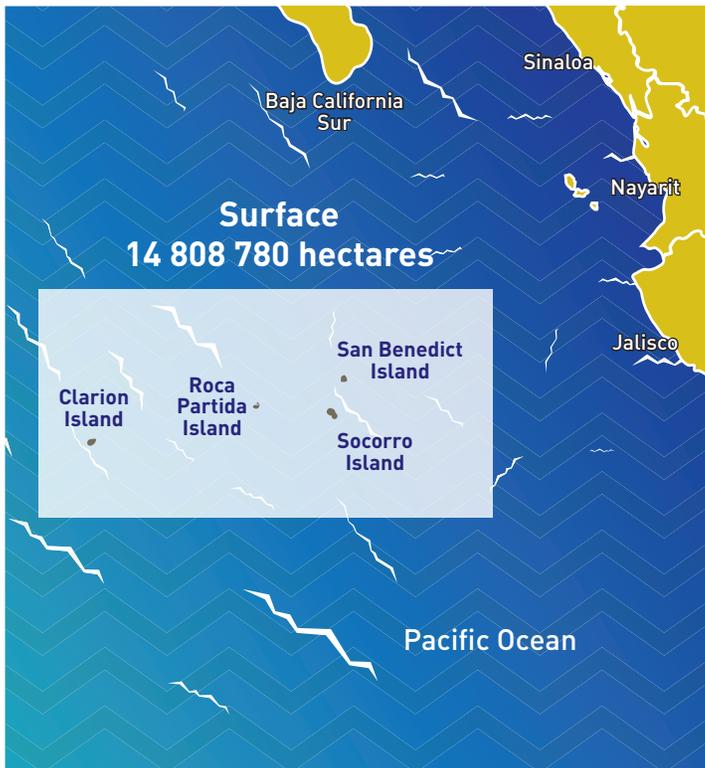
The RNP is unique because it hosts a great diversity and abundance of sharks. In fact, 28 species of sharks have been reported there: tiger, silky and Galapagos —species at the brink of endangerment— and hammerhead sharks, threatened and on the red list of the International Union for the Conservation of Nature. Whitetip sharks, silvertip sharks, blacktip sharks and dark sharks have also been spotted there.

White sharks also have presence there, and it is one of the most important potential touristic attractions of the area, together with the shark whale. Both species are charismatic and emblematic of the islands.

The abundance of sharks is the largest in North America, and the presence of all sizes, even young and pregnant females, reflects that Revillagigedo is a key area for reproduction and breeding.

Another exceptional inhabitant are the giant oceanic rays (*Manta birostris*). The In-





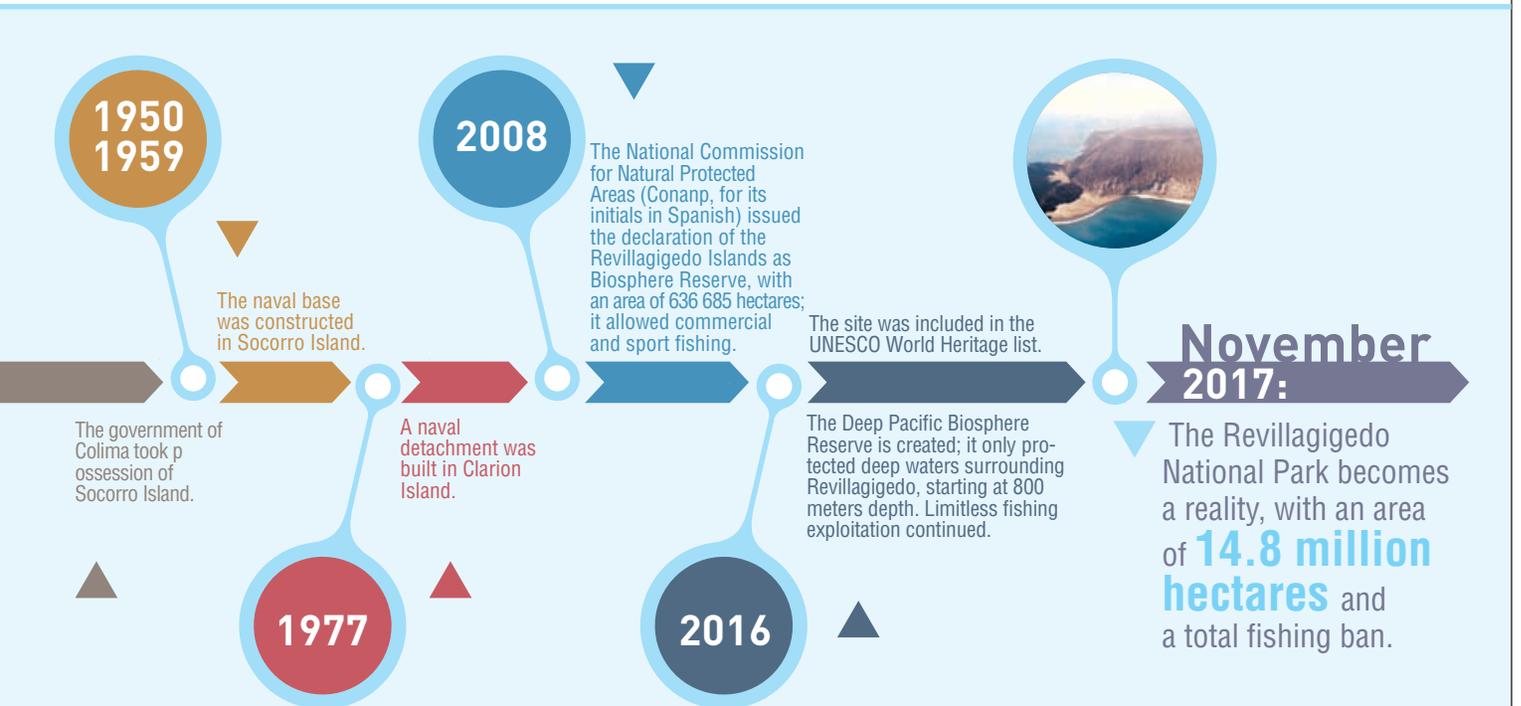
## Four magical islands

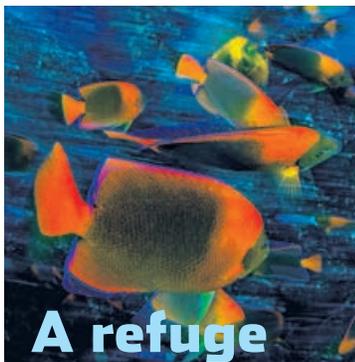
By Arturo Ayala Bocos  
Ecosystems and Conservation (ECO): Proazul Terrestre a.c.

The Revillagigedo Archipelago is located 350 kilometers southwest of Baja California Sur, and four islands comprise it:

- **Socorro Island:** it is the largest of the four islands, home of the naval base and refuge for many beautiful birds and plants that can only be observed there, and at its highest peak, Mount Everman, it is possible to see the fumarole of a still active volcano.
- **Clarion Island:** it is the second largest of the islands and the one furthest away; to get there one must sail for 45 hours from Los Cabos. It possesses great animal and plant diversity in its vast lands.
- **San Benedicto Island:** it presents a grey and rocky landscape because of the last eruption of The Barceno volcano in 1952, which gives the island an impressive aspect.
- **Roca Partida Island:** it is the smallest island, barely 70 meters long and 15 meters wide. This is, undoubtedly, the most impressive and magnificent of the islands in terms of wildlife in the middle of the Pacific Ocean.

The toponymic denomination of the Islands as Revillagigedo is attributed to the sailor James Colnett. They were named after the viceroy Juan Vicente de Güemes and Padilla, Second Earl of Revillagigedo, who was the 52nd viceroy of the New Spain, from 1789 to 1794, under the reign of King Charles IV.





## A refuge for corals

By Amber Carter

The Revillagigedo National Park is home of one of the most diverse and pristine coral communities of the Tropical Eastern Pacific. Due to its optimal condition, it is the perfect refuge for these species, where they have greater possibilities to survive in case of extreme weather conditions.

**The Niño.** Revillagigedo is influenced by this weather phenomenon because it experiences a thermal abnormality of 2.4 °C (compared to 4 °C in the Equator). So, it is likely for The coral bleaching and mortality to be minor. If The Niño strengthens because of climate change, the corals in the Park can avoid the worst part of the effects.

**Cooling of the tropical cycles.** The Islands are hit, in average, by three tropical storms per year, which provoke the surface temperature to cool down up to 6 °C, as deep, cool waters come up to

---

A report from the first Mexican scientific expedition in 1862 mentions the advantages of the islands for the creation of a colony of convicts, to put an end to death penalty in Mexico.

---

ternational Union for the Conservation of Nature considers them to be vulnerable and it is one of the most important attractions for scuba diving tourism in the area.

### — ENCOUNTER WITH GIANTS

To get to the islands, one must travel by boat for at least 36 hours (setting sail from La Paz, Baja California Sur); as it is to be expected, there is not much human presence there, except in Socorro Island, where there is a naval base... So, it is an ideal place for conservation tourism, particularly scuba diving.

From November to June, the Park receives close to 3 500 visitors, anxious to meet the great pelagic species: rays, whales and sharks. "You liaise with professional scuba divers, with a great conservation spirit, very respectful", tells us Dora Sierra Sandoval, tourism operator at Revillagigedo.

To the interviewee, owner of the boats "Rocío del Mar" ("Sea Dew") and "Quino el Guardián" ("Quino the Guardian"), the role of tourists is fundamental, because they are the "citizen guardians".

Although the income conservation tourism generates is considerable, it is imperative, more than ever, to regulate these activities to avoid any damage to the ecosystems of the protected area. "With the expansion of the polygon, we will be able to protect these precious islands even more", says Dora.

Because of the above, tourism operators must be aware that their contribution to safeguard the crowning jewel of the oceans in Mexico is fundamental.

### — WORLD CONNECTION

Once again, it is important to highlight the privileged location of the Revillagigedo National Park, because it complies with the ideal conditions to include it as part of the Eastern Tropical Pacific Marine Corridor. It is a cooperation agreement supported by the International Union for the Conservation of Nature and the UNESCO that seeks to join the efforts of Ecuador, Costa Rica, Colombia and Panama, because these countries share charismatic marine species, as well as birds, coral reefs and pristine insular ecosystems.

School of whitetip reef sharks.





So, Revillagigedo should join this great initiative integrated by the Galapagos Islands, the Coiba National Park, the Cocos Island National Park, the Malpelo Sanctuary and the Gorgona Natural National Park.

The main objectives will be to foster the conservation of biodiversity and the marine and coastal resources, with special focus on ecosystems and species that are threatened or endangered, endemic or of ecological or economic importance.

#### — PENDING ISSUES

It is an honor for our country to be able to say that we have the largest marine park with a fishing ban in North America; however, this is only a first step. From here onwards, it is imperative to create a resource management program that guarantees the protection and surveillance of Revillagigedo at perpetuity. It is not just about the decree, now we must make the protection a reality, and of course it is not an easy task.

To Juan Martínez, Ecology Researcher at Conacyt (National Council for Science and Technology), the pending issues that arise from the creation of the park are:

Control the nocturnal luminescence emissions of the boats that sail the area.

Establish land research centers to protect sea birds, like the Revillagigedo petrel, "that is as endangered as the porpoise".

Maintain the integrity of the land habitats so endemic species can survive and recolonize degraded areas. Table (must go together with a map that shows the location of Revillagigedo, and the polygon that comprises the National Park. Attached is a reference image, but the map must be redesigned to go with the style of the article).

do at perpetuity. It is not just about the decree, now we must make the protection a reality, and of course it is not an easy task.

To Juan Martínez, Ecology Researcher at Conacyt (National Council for Science and Technology), the pending issues that arise from the creation of the park are:

- Prevent the introduction and dispersion of exotic sea and land species.

---

- Ease the reintroduction process of the Socorro dove.

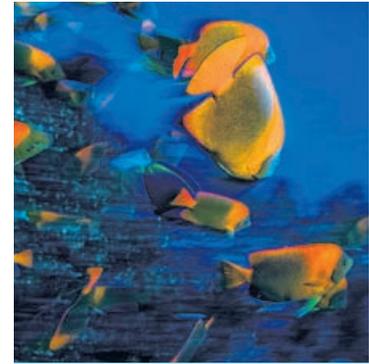
---

- Ban any type of fishing (sport or industrial).

---

- Regulate the conservation tourism.

---

the surface. Given that tropical storms occur in the hottest months of the year, their cooling effects can reduce the heat stress on corals. Besides, the regular presence of tropical storms will interrupt the yearly warming cycle, reducing the maximum temperature of the water, and therefore the coral bleaching threat caused by ocean warming.

**Connectivity.** Revillagigedo is a key trampoline for coral larvae between the Indian and Central Pacific and the Mexican Continental territory. This connectivity maintains the biodiversity and increases the possibilities of recovery of those corals affected by bleaching.

**Human presence.** The islands are not inhabited (except for the naval base) and most of the human activity, mainly recreational scuba diving, occurs in deep waters, far away from the islands and the coral reefs. This has allowed for the reefs to be in pristine conditions.

# THE SEA BUTTERFLIES

By Alberto Tinoco Guadarrama | @albertotino



A shadow is seen in the distance. It is an enormous black spot that ascends from the depths and approaches. In the water column where sun rays refract, the halocline fades its silhouette, it is then when imagination replaces sight. Passed the current, when everything clears up, you discover a strange creature, of colossal size, that moves slowly and rhythmically. Its presence enchants you, like the mermaid song. Its big and deep eyes seduce you, like if you were hypnotized, in a visual contact that traps you. And at the slightest movement, that thing that seems to be a sea butterfly, can take you to “the blue” ... a place nobody comes back from.

## THE BOILER

After a 25-hour journey, we have reached Mexico's last frontier. I am at The Boiler, an inexplicably strange place that has never belonged to men, but to sea creatures. It is an underwater pinnacle, shaped as an oval, and with waves breaking at its tip. Underneath, there is a wall made of petrified lava that goes down 45 meters, and is a refuge for marine life. It is the most emblematic site of San Benedicto Island, a volcano that raises 310 meters above the

sea level and is part of the Revillagigedo National Park, the new conservationist bastion, located 400 kilometers away from Baja California Sur.

I am part of an expedition of the Coalition for the Defense of the Seas in Mexico, CODEMAR. From now on, in “Revilla”, as divers call it, any kind of fishing, commercial or sport, is banned. The nuclear zone of this natural area goes beyond the horizon. 14 800 000 hectares that are now protected by the law. No other insular possession, out of the almost 4 000 islands that exist in Mexico, had reached National Park category with a fishing ban.

At a 24-meter depth, The Boiler reveals an underwater world which is not ruled by federal decrees. It is a privileged site, unique in the world, for the sighting of the portentous giant manta (*Manta birostris*). The first time you come across a giant manta, it stays in your memories forever. They are curious, it is not necessary to go after them, sooner or later, this shark relative approaches. You just must only wait.

Being submerged in the ocean is always a special moment. Only there you can let yourself go, while an animal that can weigh up 2 tons and has a 9-meter span,



Alberto Tinoco photographs a *Manta birostris*, in San Benedicto Island. Using photoidentification, it is possible to know if a specimen was previously spotted in Roca Partida. Photo: Ramón Castellanos.

approaches; they can travel very long distances and go down great depths. I observe the giant manta, its body is a flat rhomboid, with triangular pectoral fins that resemble wings. They are cartilaginous fish, boneless and nose less, and their mouth is on the front part of their head. Their caudal spine is thin, like a whip, but without the poisonous stings mantas usually have. Their skin is rough and is covered by a slime that protects them from infections. It is the fish with the largest brain, which maybe explains their intelligence.

### THE CANYON

I dive in The Canyon, another site in San Benedicto. Starting at a 15-meter depth, it is possible to observe a rock crest that descends gradually until it reaches the cliff. Suddenly, another giant manta approaches, it comes so close that it is possible to see how it unfolds its cephalic lobes and follows you with its eyes. I would dare to say it is analyzing you, trying to figure out what you are, and I suppose its electro-receptors can, same as for sharks, perceive if you are excited or frightened. Its main disc must be 5 meters, I have it in front of me, five meters away at the most, the water transparency deceits you, things appear closer than what they really are. And precisely when you think the bubbles from the regulator will scare it away, it stays right above me. My bubbles caress it, and it seems to like it, turns around and comes back curious. I can clearly see its gills and its spotted ventral area, with a pattern that makes it unique; these spots are something like digital prints that researchers use to photo ID giant mantas. It swims escorted by a remora, that is adhered to its body. The remora is an opportunistic fish that eats the manta's leftovers. If you look towards the surface, its enormous body creates a light effect that is like an illusion, the enchantment of sea butterflies has taken effect.

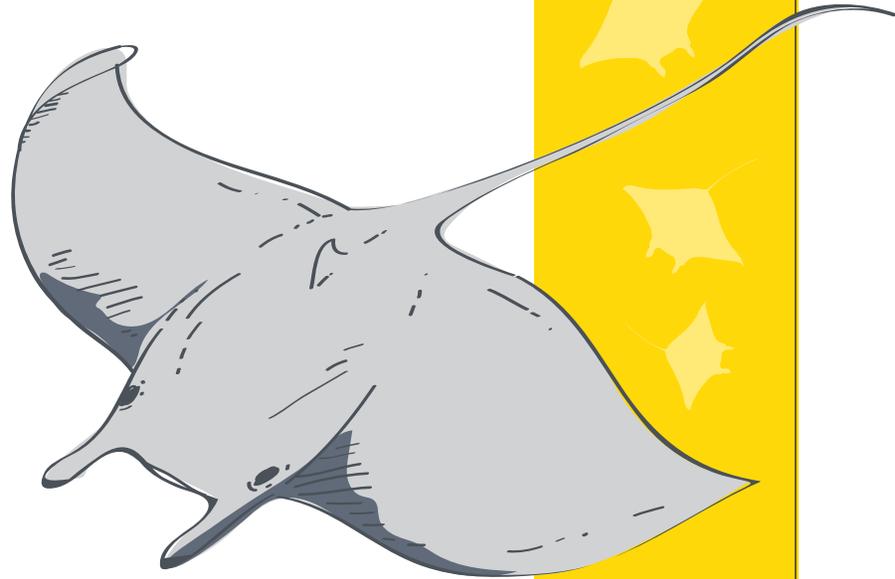
### UNPRECEDENTED RECORD

In 2014, year of my first expedition to Revillagigedo, we were on board the "Deepsee" submarine, and we video recorded a manta feeding at 130 meters depth, an image that stayed forever on my travel journal.

After descending 300 meters, we only found small benthonic organisms, which we had already recorded in other expeditions. When we started the ascension, accompanied by the deafening sound of the nothing, the submarine captain, Felipe Chacón, exclaimed: "Check it out, it is a bloom!". The water got murkier because of the presence of zooplankton (organisms that live in the water columns, like small crustaceans, worms and mollusks, as well as eggs and larvae, which constitute most important feeding source for sea creatures).

We saw something was moving unusually, like a spiral. When we approached, we realized it was a giant manta feeding, it folded its cephalic lobes to channel the food straight into its mouth, whilst it continued to swim in circles, filtering the water through its gills.

Weeks after that, our image reached the desk of Dr. Robert Rubin, probably one of the researchers that knows more about giant mantas, and he confirmed it was a unique image, that widened the observation record of this species in Revillagigedo.



In the last 20 years, the Pacific Manta Research Group, headed by Dr. Rubin, has been able to photo ID more than 350 individuals and determine the connectivity between the population of giant mantas and the islands of the National Park.

Today we know giant mantas reside in the Archipelago, with great affinity to the site, which makes them vulnerable to any impact to the zone. The researcher James Ketchum, from the organization Pelagios Kakunjá, participated in a study to determine the recreational scuba diving capacity for Revillagigedo, and he pointed out that The Boiler in San Benedicto seems to be reaching its limit. Roca Partida and San Benedicto are the sites that are already at their full capacity, and access should be controlled. Our recommendation is no more than two scuba diving boats on these sites and maximum one scuba diving group at a time."

Revillagigedo records an average of 3 000 divers a year, and most of them come seeking giant mantas.

According to the International Union for the Conservation of Nature, giant mantas are considered vulnerable. In our country the species is protected by Official Mexican Norm NOM-059-SEMARNAT-2010. The reality is that they are fished illegally, or incidentally by tuna fish boats. In the Asian markets, it is believed their gills possess medicinal properties. It is estimated that, on a global scale, the capture of giant mantas adds up to 1 000 individuals per year. In Mexico a giant manta is sold in the black market for 500 dollars or less. Alive, the Revillagigedo giant can generate up to 30 000 dollars a year in conservation tourism.

The scientific community warns the genus "Manta" will cease to exist. *Manta birostris* will now be *Mobula birostris*. To me, they will always be sea butterflies.

### ABOUT THE AUTHOR

Journalist and  
Associated Producer  
for the television  
project Por  
el Planeta.

Photo: Francisco Ramírez.



“The best legacy a human being can leave to its children is a well

**preserved planet  
to live in”**

Interview with Rafael Pacchiano Alamán,  
Secretary of Environment and Natural  
Resources.

**At the start of his administration, he set two very clear objectives: reinforce the conservation of the national marine ecosystems and increase the area of protected ocean in Mexico. Today, just over two years down, the Secretary achieved the creation of the Revillagigedo National Park, the largest protected marine area with a fishing ban in North America.**



**T**he Revillagigedo Islands are the crowning jewel of the seas in Mexico; their biological characteristics make them a unique place in the world, a true marine and land paradise. Its declaration as Natural Protected Area, under the National Park category, means this region of the Pacific Ocean will be protected perpetually.

We had a conversation with Secretary Rafael Pacchiano Alamán, who talked to us about the background of the project, as well as the main challenges encountered to obtain the decree.

#### **— HOW DID THE PLAN TO CREATE THE REVILLAGIGEDO NATIONAL PARK AS A TOTAL FISHING EXCLUSION AREA CAME UP?**

The plan to create the National Park came up as the result of a commitment made by this administration: to safeguard Mexico's natural patrimony. We are a mega diverse country and we have the responsibility to look after this great patrimony.

The National Park is also a response to the commitment acquired last year, when the UNESCO declared the Revillagigedo Islands a World Heritage site and recommended the Mexican government to widen the protection of the area: at that point the protected area extended only towards the insular part and a very small marine portion (the suggestion to widen the area was made because of the importance to maintain the interconnectivity among the islands). Afterwards, the Department of Environment and Natural Resources (Semarnat for its initials in Spanish) and the National Commission for Protected Natural Areas (Conanp) gathered a group of experts to work with them and developed a proposal to comply with the recommendation and guarantee the protection of the marine biodiversity of the islands at perpetuity.

#### **— WHY CHANGE THE STATUS FROM BIOSPHERE RESERVE TO NATIONAL PARK?**

The islands and the sea do not belong to anyone, they belong to the Nation. A Biosphere Reserve is a legal status which implies that somebody is the owner of the land and therefore some sort of activity could take place there. Revillagigedo is a federal zone,

belongs to the Nation, and therefore the National Park status is more suitable.

It is the most restrictive status and specifically bans extraction activities of any species. If we realize today that the Revillagigedo Islands are vulnerable to illegal fishing, or overfishing, we must guarantee from a legal perspective, that the fishing restriction will be followed. Only the National Park status can achieve that.

It is very important to ensure that the islands will continue to have the same protection as they did under the Biosphere Reserve Status; we will not allow, under any circumstances, the construction of any sort of infrastructure, except the already existing military infrastructure, so the Mexican State can indeed protect the area. Likewise, we will strengthen the already existing strategic alliance with the Navy, so we can protect our marine natural resources.

#### **— HOW DID THE EXTENSION OF THE NEW POLYGON WAS DETERMINED?**

After very meticulous analysis, we concluded that the 14.8 million hectares polygon is vast enough to guarantee the conservation of the species that inhabit the islands. It is the largest marine park in North America.

#### **— HOW HAS THE NEGOTIATION WITH THE FISHING INDUSTRY THAT OPERATES IN THE POLYGON BEEN?**

We have shared with the stakeholders the information produced by the Interamerican Commission of Tropical Tuna, which recognizes that less than 6% of the yellowfin tuna and less than 5% of the skipjack tuna are fished in Revillagigedo. The Commission itself recognizes that there are, at least, 200 sites in Mexico where double the amount of tuna is fished, compared to the established polygon.

We have insisted on the vast marine diversity of Revillagigedo and its vulnerability; we have also shared with them national examples of the effects of a fishing ban in marine areas and how fisheries can recover. We have a very successful example in Cabo Pulmo (Baja California), where a fishing restriction was put in place and the biomass of the area has gone up 400%;

“THE REVILLAGIGEDO NATIONAL PARK GUARANTEES THAT THIS UNIQUE PLACE WILL BE PRESERVED AT PERPETUITY, SO OUR CHILDREN AND GRANDCHILDREN GET TO KNOW THE SAME REVILLAGIGEDO AS THEIR GRANDPARENTS, THAT IS THE SPIRIT OF THIS PARK”.

there is another example in Campeche, where 11 fisheries were over exploited and after a fishing ban was put in place, many of them have recovered.

We are convinced that when we give nature the opportunity to recover, we obtain great gains, even the tuna fish industry will benefit.

This information does not come from the environmental sector, it is information gathered from the fishing industry.

#### — WHAT DO US, AS CITIZENS, GAIN FROM THE CREATION OF THIS MARINE PARK?

The best legacy a human being can leave to its children is a well-preserved planet to live in. It is worthless to leave them an education or any monetary inheritance, if we do

not leave them a planet to live in.

This National Park guarantees that this unique place will be preserved at perpetuity, so our children and grandchildren get to know the same Revillagigedo as their grandparents, that is the spirit of this park.

#### — WHAT IS THE NEXT STAGE?

We were extremely careful in the elaboration of the Technical Justification Study as well as in the writing of the decree. We have worked with the experts and our lawyers to cover every aspect, to anticipate for any lawsuit.

Anyone who feels has been affected by the creation of the Revillagigedo National Park, should embrace it instead of opposing it, it is the best legacy for our children.

### — ABOUT RAFAEL PACCHIANO ALAMÁN

Congressman for the LXI Legislature representing the Green Party. VP for Global International, Mexico Chapter. Represented the Green Party at the Asia-Pacific Parliamentary Forum and the Mexico-Brazil Interparliamentary Meeting. He was also a member of the Budget, Public Account, Environment and Natural Resources Commissions.

Coordinator of the Youth National Program during the transition period for the President Elect and in December 2012 was named Deputy Secretary for Environmental Protection within the Department of Environment and Natural Resources (Semarnat), during his time in post, he implemented a program for the recovery of the porpoise in the High Gulf of California

Since 2015, he has acted as Secretary of Environment and Natural Resources.

# SHARKS: KINGS OF THE OCEAN

Sharks are some of the most ancient and meaningful aquatic creatures of our planet. Their role as predators is essential to the preservation of biodiversity in marine ecosystems, because they are a key health indicator of the ocean: they keep in balance the habitats of other species.

Their presence in the oceans is threatened for two main reasons: excessive fishing for their meat, skin and fins, and pollution caused by trash and spills

SHARKS  
HAVE INHABITED  
THE PLANET  
FOR MORE THAN  
**450 MILLION**  
YEARS.

THERE ARE  
MORE THAN  
**460 KNOWN**  
SPECIES OF SHARKS.  
THERE ARE 106 IN MEXICO.

**11 SPECIES**  
ARE ENDANGERED:  
THE WHITE SHARK,  
THE WHALE  
SHARK AND  
THE PILGRIM SHARK  
ARE AHEAD ON THE LIST.

SHARK CATCH  
REACHED ITS  
HISTORICAL PEAK  
IN THE YEAR  
**2000 AT**  
**888 000**  
TONS.

MEXICO IS THE SIXTH  
COUNTRY IN THE WORLD  
WITH THE  
**WORST**  
SHARK KILLING RECORD,  
BETWEEN **4.5** AND  
**10 MILLION**  
DIE EACH YEAR.

**100 MILLION**  
SHARKS DIE EACH  
YEAR BECAUSE THEY  
ARE CAPTURED  
FOR THEIR FINS.



One single  
**ocean**

**Alejandro del Mazo Maza has the mission to successfully protect and watch over the Revillagigedo National Park; the eyes—and hopes— of the international conservationist community are set on him. As head of the National Commission for Protected Natural Areas (Conanp for its initials in Spanish), he must prove that Mexico is in fact world leader in marine conservation.**

It was last October in Malta, and in front of leaders of more than 100 countries, that Del Mazo Maza announced the declaration of the Revillagigedo Islands as National Park; he received a standing ovation then and the news were welcomed by personalities such as Sylvia Earle and Prince Albert of Monaco.

Time has gone by, and today the park is a reality, and to guarantee the protection and perpetuity of the ecosystems the biggest marine park in North America shelters is no easy task; the Commissioner will have to regulate the conservation tourism—and do not surpass the capacity of the zone—prevent any kind of fishing and preserve the habitat of countless species.

#### — HOW WILL THE PROTECTION OF THE REVILLAGIGEDO NATIONAL PARK BE GUARANTEED?

Fortunately, we can make use of the technology available and through satellites locate any fishing boats in the region, which allows us to be very precise in strengthening the protection and surveillance of the waters surrounding the islands.

Furthermore, there is a Navy base in Isla Socorro, which will make the conservation of the area more effective. The Navy has already had satisfactory results, for example in the High Gulf of California (with the porpoise).

In this sense, the protection and surveillance of the protected natural areas has strengthened, thanks to the creation of the environmental police division, which has already brought in results.

#### — WHAT ARE THE PRIORITIES FOR THE ISLANDS?

Sylvia Earle has mentioned that one of the most important sites that requires to be protected is Revillagigedo; with this marine park, we want to preserve the connectivity it offers to pelagic migratory species that it shares with the Marine Corridor of the Eastern Tropical Pacific.

We must preserve this site which is home to one of the highest concentration of shark species and is also home to endemic species such as the clarion angelfish.

Likewise, we will also implement programs for the management of invader species, such as feral cats. The objective is that the Socorro dove can return to its land habitat.

It is also fundamental to work together with the academia and the scientific community. The participation of all involved is very important.

**“WHAT HAPPENS IN THE OCEAN IS TOTALLY CONNECTED TO LIFE ON LAND”.**

In Mexico, there are **182** natural protected areas.

They account for **90.8** million hectares.

The **protected marine** surface is

**69 458 748** hectares.

They correspond to **22%** of the **country's total marine area.**



#### — ABOUT THE COMMISSIONER

He has a degree in Policy Making and Environment and Energy Management by the University of Flacso and a Diploma in Administrative Finance by the Harvard University.

President of the Climate Change Commission during the LXI Legislature.

Deputy Director for Natural Resources at the Federal Agency for the Protection of the Environment from 2013 to 2015.



# THE LATIN AMERICAN LEADERSHIP

By Cristian Laborda | @cristianlaborda

LATIN AMERICAN COUNTRIES ARE DOING HUGE EFFORTS TO MERGE ECONOMIC GROWTH WITH SUSTAINABLE OCEANIC DEVELOPMENT.

This year, 2017, has been extremely important for ocean conservation and protection. During the Fourth Edition of the conference Our Ocean—organized by the European Union in the Island of Malt—a considerable number of countries announced the creation of new Marine Protected Areas (MPA). The latter, in its various denominations, leads to the maximum level of protection.

From the Cook Islands, to New Zealand, Palau, Fiji and Canada, work is being done to protect the blue giant, which absorbs 90% of the heat generated by human activity and 45% of the CO<sup>2</sup> emissions.

In this context, Marine Protected Areas play a fundamental and determining part in the fight against climate change, and they also contribute to the preservation of marine biodiversity, especially of fishing resources which have been under enormous pressure for years, in the oceans of the five continents.

Fortunately, the idea that defined MPA as an antagonist tool to fishing activities, is now in the past. The denominated spillover effect

is well documented in modern scientific literature, and it supports—empirically—the catalyzing role MPA play in the recovery of fishing resources. Likewise, those coastal areas have become true vectors of social mobility and economic growth for the local communities.

In this global context (because oceans are geographically connected all around the globe due to currents), Latin American countries have not stayed behind and are doing huge efforts to merge economic growth with sustainable oceanic development. This represents a tremendous challenge for developing countries, which is the case for most in Latin America.

In the past few years, Chile, Ecuador, Colombia and Costa Rica, among others, have lead the creation of MPA. For example, Chile committed to protect 46% of its Exclusive Economic Zone. It is important to underline that this country, together with Ecuador, Peru and Mexico are among the 25 countries with greater fish landing, according to the FAO; and it is precisely this characteristic which makes their efforts even more valuable.



The developments in ocean conservation that committed countries are showing are extremely positive, and these are even overcoming hurdles from other national needs as well as the political and mediatic pressure exerted by fishing companies. However, local communities and society are going even faster in terms of awareness of ocean conservation. Gradually, they are understanding the importance of protecting specific marine areas, to give continuity to the natural marine life cycle in the long term, without human intervention, to allow the optimal recovery of marine spaces and their biodiversity.

Luckily, many countries have been adhering to their international commitments, expressed in Aichi and other forums, but mostly, they have listened to their own society, which is more and more environmentally aware and empowered.

With specific conservation actions, Latin American countries are raising up to the international challenges and responsibilities. The most important one is the UN Convention on the Law of Sea (Convemar for its initials in Spanish) —“the Oceans’ Constitution”— of which 168 nations are part. This code has granted on of the most valuable assets a coastal country can have, the Exclusive Economic Zone, whose sovereign rights for coastal countries have generated billions of dollars

in benefits. The UN Convention on the Law of Sea compels countries, based on its norms and principles, to preserve and protect the marine environment (Part XII, Section 1 Article 192).

The latter explains why is the creation of the Revillagigedo National Park so important for Latin America and the world. The Park is rich in biodiversity and has an area of 14.8 million hectares, which make it the largest marine park in North America.

This way, Mexico becomes part of the Latin American leadership in ocean conservation and preservation. Now, the Aztec country assumed the huge challenge of monitoring and surveilling this new MPA. With this, it seeks to reach the balance between growth and environmental protection. Both essential elements for countries which face social and economic asymmetries.

Now that the year is coming to an end, we can say —very accurately— that it is time to look at the “oceanic glass” as half full, because Mexico and other Latin American developing countries have taken on board challenges that are usually taken on by developed countries. These countries show commendable commitment with the present and future of the ocean, which will surely be the best legacy for future generations of Mexicans and Latin Americans.

## UNITED WILL TRIUMPH

By Zoila Bustamante

### THE TRADITIONAL FISHING SECTOR WORLDWIDE IS COMMITTED TO THE FUTURE OF THE SEA.

According to the FAO, traditional fishing accounts for 90% of the people employed in capture fishing. Therefore, it is essential to consider the opinion, participation and needs of this sector for any decision concerning the international fishing industry.

The latter is fundamental now more than ever, because we urgently need to find new ways to satisfy an increased demand in food supplies for a growing population that, to a great extent, consumes sea products.

As we can see, traditional fishermen are a fundamental link in this chain, more so if we consider that marine ecosystems are suffering from permanent exploitation from the fishing industry and illegal fishing.

Knowing that marine resources are limited, traditional fishermen celebrate the new ocean and biodiversity conservation trends, which each day have more presence in different countries. Specifically, we applaud any measures taken against industrial fishing boats that do not spare any efforts to continue pillaging the natural resources and are indifferent to the scientific evidence that indicates that resources are lessening by the day.

Fortunately, more and more, the traditional fishing sector worldwide is committed to the future of the sea, because we are convinced, based on our own experiences, that when ocean overexploitation is put under control, our ancestral extracting activity will be safe, and as so will the food supply for the population.

We, traditional fishermen, are part of a chain of efforts to bring fresh, high quality and healthy food to people’s tables. Furthermore, we encourage responsible fishing, the progressive elimination of non-selective practices —like trawling— and the precautionary measures to regulate global fishing quotas.

#### ABOUT THE AUTHOR

For over 10 years, he has worked in topics related to marine conservation, fishing and Law of the Sea. He worked for the Department of Fishing in Chile and lead the Oceanic Affairs Area of the State Department. He was also a lobbyist in many international forums, including the UN and FAO.

#### ABOUT THE AUTHOR

President of the National Confederation of Traditional Fishermen in Chile (CONAPACH for its initials in Spanish) and representative of the Latin American Union of Traditional Fishermen.

# The Tuna Industry in the light of the **Revillagigedo** **National Park**

By Gabriel Quadri de la Torre | @g\_quadri

Regrettably, the tuna fish industry decided to oppose the creation of the Revillagigedo National Park. With this action, it chose to be on the wrong side of history. It is essential for the industry to focus on overcoming its sustainability issues. It must ensure the viability of its own long-term interests, which undoubtedly include the conservation of stocks and the ecosystems that support its business. Revillagigedo will be a key element

to achieve this, as well as to guarantee a sustainable supply of tuna protein for Mexicans in the long term. The Mexican tuna fish industry claims to be committed with sustainability; supporting the creation of the Revillagigedo National Park would be an unequivocal sign of this, as well as of its awareness of the national interest and desire to preserve the ecological patrimony of Mexico and the world.



### — TERRITORIAL SCOPE OF THE OPERATIONS OF THE MEXICAN TUNA INDUSTRY AND THE REVILLAGIGEDO NATIONAL PARK

The fishing effort of the Mexican tuna fleet covers the entire Mexican territorial and patrimonial sea in the Pacific Ocean, and goes well beyond international waters, with a total area of 1 500 million hectares.<sup>1</sup> This surface accounts for over two thirds of the distance between Mexico and the Hawaiian Islands, and towards the south almost the entire Centro American coast. It is such a vast area, that there is record of Mexican cast nets 200 nautical miles north of the Galapagos Islands in Ecuador.

The Mexican Exclusive Economic Zone in the Pacific Ocean is 232 million hectares.<sup>2</sup> The area the Revillagigedo National Park covers is 14.8 million hectares, which accounts only for 0.9% of the total reported tuna fishing area, and less than 7% of the Exclusive Economic Zone in the Mexican Pacific. The area of the Revillagigedo National Park polygon derived from the specific recommendation the UNESCO made to the Mexican government to extend the protection of the World Heritage site to at least 40 nautical miles around the islands. The polygon is designed to guarantee the integrity of different biological corridors, the genetic interchange and the internal and external migration routes for a multiplicity of species.

[1] Estimated area based on the dispersion of the fishing zones for the Mexican tuna fleet, using public domain data from the ICTT for 2015 (<http://bit.ly/2z1GNKm>).

[2] <http://www.biodiversidad.gob.mx/pais/mares/>

### — CAPTURE WITHIN THE NATIONAL PARK POLYGON

Based on public domain data from the Interamerican Commission of Tropical Tuna, the total percentage of annual capture of yellowfin tuna and skipjack tuna by the Mexican fleet within the National Park polygon average only 5.3% and 4.3%, respectively.<sup>3</sup>

### — EMPLOYMENT WITHIN THE TUNA FISH INDUSTRY

It is unreal to think that the Revillagigedo National Park poses a threat for the 30 000 jobs the tuna fish industry creates. This is due to two basic considerations. The first one is that the potentially affected capture accounts for a very small percentage of the total capture. The second one is that the industry will compensate this capture in other areas of the Exclusive Economic Zone of our country or in international waters, without compromising its competitiveness and without saturating the fishing effort. In fact, according to the Interamerican Commission of Tropical Tuna (IATTC), there are more than 200 other fishing areas for yellowfin tuna in the Eastern Pacific Ocean (EPO), where the Mexican fleet has captured this specie with twice the efficiency of what is recorded, in average, in Revillagigedo in terms of the Capture per Unit of Fishing effort.<sup>4</sup>

### — DUBIOUS SUSTAINABILITY AND CERTIFICATION OF THE MEXICAN TUNA INDUSTRY

The total capture of the Mexican tuna fleet has remained constant at approximately 100 000 tons per year, despite a notorious increase in the fishing effort, measured through the cast nets on dolphins, that went up 22% between 2009 and 2015.<sup>5</sup> In addition to this, the IATTC has documented that in just 4 years the average weight of a yellowfin tuna in the EPO has gone down 53.3%: from 13.2 kilograms in 2012, to 6.2 in 2016.<sup>6</sup> The latter clearly expresses that the fishery is heading to its maximum sustainable exploitation level and is at the brink of overexploitation. Recent estimates of the

yellowfin tuna reproductive biomass, mortality and parent/offspring ratio confirm the pessimistic outlook.

Clearly, there is overcapacity and excessive fishing effort, which could soon overflow the sustainable maximum. Numerous players consider that yellowfin tuna fisheries are overexploited.<sup>7</sup> As mentioned before, the captures of different IATTC countries show an important decrease in the average weight of yellowfin tunas, which suggests fleets are capturing younger specimens;<sup>8</sup> this is consistent with the drop of the population and the reproductive base. The industry and its own regulating and coordinating body are aware of the sustainability issues they face. In fact, during a recent meeting of the IATTC in Mexico City, members agreed longer fishing ban periods during the year, although this measure comes in late and is insufficient.

The Mexican tuna industry has made public a recent partial certification obtained from the Marine Stewardship Council (MSC). A worrying aspect about this certification is that many countries have severely criticized this entity, specifically the methodology used to determine if the incidental fishing of any given fleet is sustainable.

At the beginning of this year, at least 50 NGOs expressed their concern because the MSC does not adequately evaluate the effects of incidental fishing on many species, including dolphins, whales, sharks and sea turtles.<sup>9</sup> In this context, it is perceived that the certification obtained by the Mexican tuna industry has severe weaknesses and raises serious questionings, therefore it does not guarantee the sustainability of its activities.

### — MORTALITY OF OTHER SPECIES AND ECOLOGICAL IMPACT

The tuna fish schools are always accompanied by predators such as dolphins, sharks, rays, turtles and birds.

## — THE AVERAGE WEIGHT OF A YELLOWFIN TUNA WENT FROM:

13.2 kilos in **2012**



6.2 kilos in **2016**



Many of these species are vulnerable or threatened. The current fishing systems have exclusions for the exit of dolphins captured incidentally, however there are no efficient escape routes provided for other species such as sharks, rays, turtles and birds.<sup>10</sup>

All the existing methods for tuna fishing, purse seining, long lining or trolling, capture and kill other species (incidental fishing or bycatching). At least 18 species or groups of species have been identified as bycatch, including sea turtles, giant mantas, hammerhead sharks, whitetip sharks, blue sharks, silky sharks, swordfish, marlin and sailfish. In addition to the bycatch caused by purse seining, we must account for the bycatch caused by long lining boats (less selective, higher impact) and the illegal or non-regulated fishing.

According to the Interamerican Commission of Tropical Tuna, the Mexican fleet “incidentally” captures and kills 10 378 individuals<sup>11</sup> from varied species of sharks that are threatened or endangered (silky, big eye thresher, blue, whitetip). Also, despite an important reduction on the dolphin bycatch, the IATTC still records an elevated death toll of these marine mammals (765) of varied species each year.<sup>12</sup> Equally, the death of thousands of billfish specimens is reported (marlin, sail fish, sword fish) among others.<sup>13</sup>

All the above threatens the integrity of the populations of many species and marine ecosystems, which are unique and fragile, like the Revillagigedo Islands and adjacent marine zones.

#### — REPRODUCTION, RECOVERY AND BIOLOGICAL SPILLOVER EFFECT OF THE MARINE PROTECTED AREAS WITH A FISHING BAN

In any case, the existence of the National Park with fishing ban represents a key sustainability element. It is an ecologic investment of great productivity in terms of

biomass, abundance and diversity and size of all species, including those with commercial value. A sustainable tuna fish industry will increase its capture outside the National Park, thanks to the park’s role as refuge, seeder, reproduction and spawning zone and feeder.

There is a yellowfin tuna population in Revillagigedo with great affinity to the islands and with dispersion and movement levels of up to 800 return nautical miles. Researchers at the IATTC and The National Fishing Institute conclude that the protected area with a fishing ban at Revillagigedo could bring in benefits for the conservation of the yellowfin tuna.<sup>14</sup> Anyway, the current capture of the tuna fish industry there represents a small percentage of the total capture.

A relevant example about the importance of exclusion fishing areas is the extraordinary case of the National Park at Cabo Pulmo (Baja California Sur), that although very small, it offers eloquent information. Since the fishing ban was established in 1999, a 400% increase in the abundance of fish has been registered, while all the top predator populations have recovered spectacularly.<sup>15</sup> Field observations offer evidence that schools of yellowfin tuna enter Cabo Pulmo to feed. Similar effects are expected for Revillagigedo.

#### — HIGH QUALITY PROTEIN SUPPLY FOR THE POPULATION

The creation of the national park will establish a vast refuge for a myriad of species, among them the yellowfin tuna, main objective and business of the tuna fish industry.

Revillagigedo, a vast refuge and protected reproduction and spawning area —together with the sustainable management of the fishery— will guarantee the sustainability of the tuna fish industry in the long run, and will also guarantee a permanent and viable supply of a high-quality protein for the Mexican consumers.

[3] Estimation base don the public domain data from the IATTC within the area of the proposed polygon (<http://bit.ly/2z1GNkM>).

[4] Idem.

[5] Idem.

[6] <http://bit.ly/2hXndSs> (IATTC)

[7] IATTC. 90<sup>a</sup> reunion. La Jolla, California. 27 June - 1 July 2016. Y. Moss Adams LLP. 2016. Performance Review of Inter-American Tropical Tuna Commission and Agreement on the International Dolphin Conservation Program.

[8] Octavio Aburto. Personal Communication.

[9] <http://bit.ly/2hXndSs>

[10] <http://bit.ly/2gB8VdJ>

[11] Lewison, RL, LB Crowder, AJ Read and SA Freeman, 2004. “Understanding impacts of fisheries bycatch on marine megafauna”. *TRENDS in Ecology and Evolution*. 19: 598-604.

[12] <http://bit.ly/2z1GNkM> (sharks).

[13] IATTC 90<sup>a</sup> reunion. La Jolla, California. 27 June - 1 July 2016. Y. Moss Adams LLP. 2016. Performance Review of Inter-American Tropical Tuna Commission and Agreement on the International Dolphin Conservation Program.

[14] <http://bit.ly/2z1GNkM> (marlin).

[15] Ben Stobart, Richard Warwick, César González, Sandra Mallol, David Díaz, Olga Reñones y Raquel Goñi. “Long-term and spillover effects of a marine protected area on an exploited fish community”. *Marine Ecology Progress Series*. Vol. 384 (May 29, 2009), pp. 47-60.

[16] Schaefer, K; Aldana, G; y Fuller, D. (2014). “Movements, behavior and habitat utilization of Yellowfin tuna (*Thunnus albacares*) in waters surrounding the Revillagigedo Archipelago Biosphere Reserve”. *Fisheries Oceanography*. 23:1, pp. 65-82, 2014.

[17] Aburto-Oropeza O, Erisman B, Galland GR, Mascareñas-Osorio I, Sala E, Ezcurra E (2011). “Large Recovery of Fish Biomass in a No-Take Marine Reserve”. *PLoS ONE* <http://bit.ly/2gBatEk>

### — SUBSIDIES TO THE FISHING INDUSTRY

More than 70% of the budget from the National Commission for Aquaculture and Fishing is allocated to subsidize the fishing industry with very serious consequences for the sector's sustainability. In the Gulf of Mexico, for example, more than 90% of the fisheries are deteriorated or at their maximum sustainable level (at the brink of overexploitation or collapse), and the that percentage in the Pacific is over 60% according to the 2012 National Fishing Gazette, which, by the way, has not been updated since, despite the legal mandate to do so.<sup>17</sup>

Government subsidies to producers translate into economic distortions, because they impede the efficient allocation of resources. Furthermore, they have negative and regressive consequences in terms of income distribution and can incentivize the overexploitation of the natural resources. Such is the case of the boat fuel subsidies the National Commission for Aquaculture and Fishing grants, which induce a greater fishing effort and impose a destructive trend for the populations and biomass of the marine species. In any case, if the objective was to lower the price of the fishing products, the



economic and social logic would indicate a direct incentive to the consumer, not to the industry. For the case of the tuna fish industry (and the entire Mexican fishing activity), subsidies are regressive and unfair because they are financed with public resources, besides, they are a determinant unsustainability factor that questions the viability of the supply of the tuna protein for Mexicans in the long run.

Furthermore, marine species (as well as land ones) belong to the Nation; they are public resources whose commercial exploitation by the private sector should be subject to the payment of rights to the State, and of course there should be no subsidies.

The consumer price for a can of tuna depends on the production costs of the supply patterns, and the demand patterns, as well as the competitive structure of the market. Artificially maintaining a low cost in the present time, based on overexploitation, only means shortage and overpricing in the future. A sustainable fishing effort in the tuna industry would imply fewer boats, shorter fishing spells and/or fishing exclusion areas; the latter can be achieved with the Revillagigedo National Park. The price per can of tuna should adjust seasonally, depending on the biological availability of the resource and ecologic public policy to protect the Mexican seas.

### — NATIONAL INTEREST AND IMPORTANCE OF THE NATIONAL PARK DECREE

The National Park status for Revillagigedo has many advantages over other conservation categories, like the current one, which is Biosphere Reserve.

The Biosphere Reserve considers the existence of local communities who have property rights and exploitation rights over the natural resources; a biosphere reserve aims at the coexistence of exploitation and conservation of the resources. This is the reason why biosphere reserves have huge buffer zones, which account for most of their polygonal area.

It is very complex to guarantee the perpetual conservation of an area when there are public and private interests at stake. For the case of marine areas, fishing exclusion zones and resource exploitation bans are hardly consistent with the Biosphere Reserve status.

As we know, the decrees for marine Protected Natural Areas face complex issues because in all of them commercial and sports fishing are permitted (except for Cabo Pulmo), or restrictions only apply for very deep water. Therefore, it is necessary to adopt a status that is sufficiently strict, like the National Park status, which establishes a total fishing ban in all the polygonal area as the fundamental principle. This guarantees perpetual conservation, clearing out any doubts and avoiding

[18] WWF Study. Guevara and Lara with data from the public account (various years) SHCP.

[19] National Fishing Gazette, published on the Official Journal on 24 August 2012.

skepticism from the national and international conservationist community.

The sea is property of the State, it is totally public. There is no private or communal property like there is in most of our land Natural Protected Areas. It is not necessary to buy or expropriate, which gives the State greater flexibility and regulatory autonomy to seek strict, perpetual conservation by means of extraction bans, environmental education and biological and landscape appreciation values. According to the General Law for Ecological Equilibrium and Environmental Protection (article 51 and others), the National Park status is enough to support a total fishing ban.<sup>18</sup> On the other hand, the National Park status is a power idea that reaffirms the sovereignty of the State over the Mexican marine territory, it is an unequivocal instrument of governability and clear evidence of the will to guarantee the perpetual conservation of the biodiversity and the ecosystems, above any other interests.

The Revillagigedo National Park means leadership for our country and the opportunity to contribute to the conservation of the world patrimony and of vital global resources, working together with countries who have created vast commercial fishing exclusion areas (Chile, Australia, France, United States). The Revillagigedo National Park will allow Mexico to take a firm step towards meeting the acquired international commitments with the UN Convention for Biological Diversity. Let us remember that the agreed goal in Aichi obliges us to declare at least 10% of our marine territory as protected areas. Equally, the Revillagigedo National Park will be part of the Biological Eastern Pacific Corridor, established with the protected areas of Galapagos, Malpelo, Coiba and Coco, together with brother countries like Ecuador, Colombia, Panama and Costa Rica.<sup>19</sup>

#### — TRANSPARENCY OF THE NATIONAL PARK DECLARATION PROCESS FOR REVILLAGIGEDO

The decree process strictly abided by the law. In accordance to article 58 of the *General Law for Ecological Equilibrium and Environmental Protection*, Revillagigedo started being a National Park on 7 September 2017, when the corresponding announcement was published in the Official Journal and the justification studies by the National Commission for Natural Protected Areas where made public (with their budget). This was followed by a public consultation period that lasted 30 days (in accordance to article 47 of the Regulation for Natural Protected Areas), where all stakeholders, including the tuna fish industry, were invited to comment and make observations. These opinions were considered in the decision-making process.

#### — TO CONSIDER...

The extension the **Revillagigedo National Park** is **14.8 millions hectares;** **0.9%** of the **tuna fishing** area and less than **7%** of the **Exclusive Economic Zone** in the **Mexican Pacific Ocean.**

Only **5.3%** of the annual capture of **yellowfin tuna** is obtained within the polygon.

There are more than **200** **yellowfin tuna** fishing areas in the Eastern **Pacific Ocean.**

The Mexican tuna fleet **"incidentally"** captures and kills **10 378** individuals from varied species of sharks which are threatened or endangered

More than **70%** of the budget from the **National Commission** for Aquaculture and Fishing is allocated to subsidize the **fishing industry.**

#### — ABOUT THE AUTHOR

Director of Environment Planning of the former Distrito Federal (now Mexico City) and President of the National Institute of Ecology. Now Associate Director of SIGEA, an environmental engineering consulting firm. Presidential Candidate in 2012 for the Nueva Alianza Political Party.

[20] Articles 46, 47 Bis 1, 50 and 51. *General Law of Ecological Balance and Environmental Protection* publish on the *Official Journal* on 16 January 2014.

[21] Biological Corridor of the Eastern Pacific [www.cmarpacifico.org](http://www.cmarpacifico.org)



# IN THE HEART OF EVERY SAILOR

By Dona Bertarelli

“IN THE HEART OF ALL SAILORS LIVE  
AN UNCONDITIONAL RESPECT FOR THE OCEAN:  
A MOST WORTHY OPPONENT, A FRIEND IN GOOD  
TIMES AND AN ETERNAL COMPANION.”

For thousands of years, Polynesian sailors challenged the Pacific Ocean in wooden canoes, using their knowledge on stars, tides and migratory birds flying patterns as their navigation tools. I often thought about those sailors when my crew and I were seeking to break the world circumnavigation record and win the Jules Verne trophy.

On 8 January 2016, after 47 days, 10 hours, 59 minutes and two seconds of —unforgettable, and sometimes relentless— time at sea, we completed our 46 700 kilometers journey. Although we reached the finishing line just over a day after the record time, thanks to the effort of the *Spindrift 2* crew, we were awarded the second-best time in history, and I had the honor to become the woman who has sailed faster around the Earth.

As Jules Verne once said, the “The Earth begun in the sea”, and who knows if it will not end in the sea as well? During the exhausting last stretch, across the Atlantic Ocean coming from the Antarctic, the ocean seemed endless. In the heart of all sailors live an unconditional respect for the ocean: a most worthy opponent, a friend in good times and an eternal companion.

What encourages me to accept these challenges and observe the ocean and its vastness and abundance —and regrettably now, its profound deterioration— is not only the thrill to compete, but the respect and love I have for the sea, something I learned from my father as a child, when we used to sail together.

Many people believe that sailing in the open sea is a lonely and isolating experience, but, the crew develops strong bonds and we feel a deep connection to the ocean and the marine life that surrounds us. Although we use satellites and state of the art technology, we still look at the sky and analyze tides, the same way traditional sailors did, and we are amazed with the sea birds and the spectacular appearance of whales.

During our last journey, we lived all the extreme situations the sea can offer, from glacial winds to scorching heat, terrifying

storms and the serene magnificence of emerald color icebergs; millenary pieces of the history of the oceans. I felt a strong connection with my sailor ancestors, in their fragile wooden canoes, and with the seagulls, tunas, sharks and other animals whose ocean travels crossed with ours.

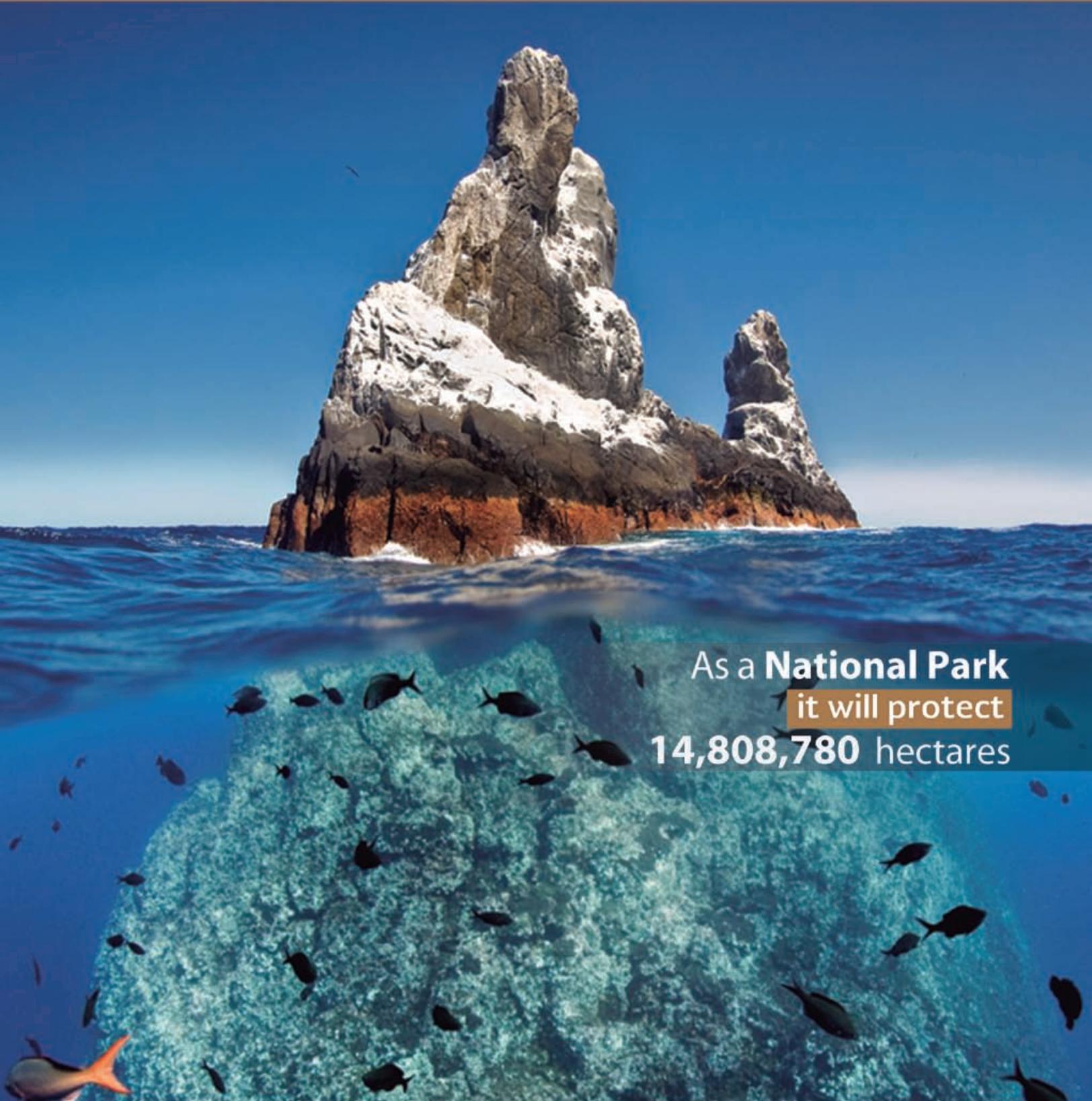
Another common misconception is that sailing is peaceful. This can be true for a pleasure trip, but it is certainly not the case for an oceanic race. It is hard to think —and sleep— hearing the constant, hoarse sound of the fiber glass hull crashing against the waves. During our spare time, we use ear plugs or listen to music to escape from the noise, but this alternative is not available to marine mammals, stressed out about the noise of thousands of military vessels and cargo ships. The increase in the acoustic pollution of the sea is one of the topics I share with thousands of kids on my blog. To me, it was fundamental for this journey to be a learning experience, not just for me, but also for those young people who perhaps will never sail, but their future is determined by the health of the oceans. Maybe, if children realize they will have oceans with more plastic than fish, they will force my generation to act. I have seen enough evidence that the ocean needs our help.

In the same way I admire the sailors from the past, I am hopeful that future generations will remember our era as the time when the power of science —and conscience— were used to recover the health of the oceans. Choosing a different path will be an unforgivable act of sabotage.

**Before the end of the year, the sail team of *Spindrift 2*, will attempt another circumnavigation in search of the Jules Verne trophy.**

**ABOUT THE AUTHOR:** Co-president of the Bertarelli Foundation, philanthropic organization created to implement real changes in ocean conservation and research in life sciences.

# REVILLAGIGEDO



As a **National Park**  
it will protect  
**14,808,780** hectares

[www.gob.mx/revillagigedo](http://www.gob.mx/revillagigedo)

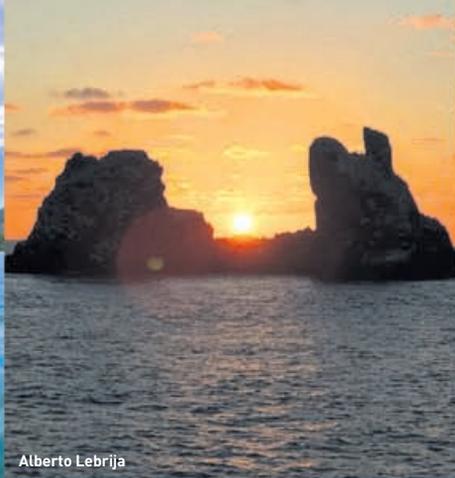
**SEMARNAT**

SECRETARÍA DE  
MEDIO AMBIENTE  
Y RECURSOS NATURALES





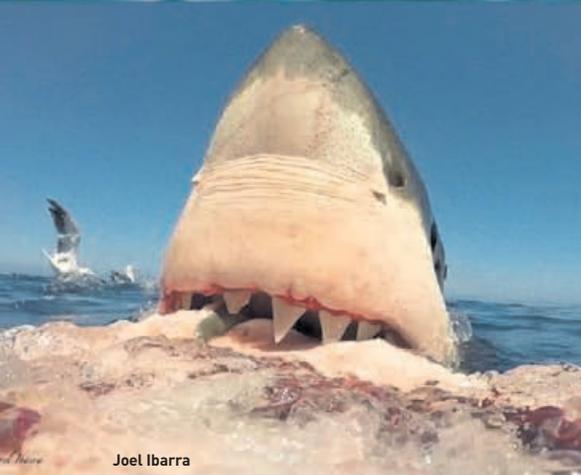
Carlos Roca



Alberto Lebrija



Erick Higuera



Joel Ibarra



Manolo Fernández



Luis Javier Sandoval



Fernanda Gómez



Jorge Cervera Hauser



Armando Gasse



Christian Vizl



Fernando Olea



Eréndira Valle