THE CORAL CORRIDOR

A world to discover


LIFE IS PRECIOUS IN ALL ITS FORMS

⊙ Introduction:

The seas of the Pacific in Nicaragua are known for their waves, warm waters and wide, sandy beaches. But in the south of the country, there is a region whose beaches border upon exceptionally clear, transparent and cold turquoise waters.

From the air, the coast in this region resembles a cookie nibbled by a hungry giant. The rocks protruding from the coastline create a series of intimate bays with beautiful beaches, where the country's tourism development has blossomed in recent decades. The region extends about 80 kilometers from the border with Costa Rica, to the northern boundary of Chacocente Wildlife Refuge. This area is known as the Coral Corridor. At the ends of the Coral Corridor there are two massive nesting beaches of sea turtles. Playa Chacocente, at the northern end of the Coral Corridor is a place favored by nature, where every year thousands of Olive Ridley turtles (Lepidochelys olivacea) nest on its shores. There, they spawn in waves, giving rise to a phenomenon known as the "arribada," or arrival. Chacocente Wildlife Refuge is an isolated place with little infrastructure development; thanks to this, it houses one of the last and best remnants of Central American tropical dry forest, as well as the nesting site for the critically endangered leatherback turtle (Dermochelys coriacea). La Flor wildlife refuge is the other major turtle nesting site, located in the extreme south of the Coral Corridor on a beach about 800 meters long. Several arribadas of Olive Ridley turtles occur in a season, making this beach one of the few places in the world where you can observe this phenomenon. The mass nesting of Olive Ridley occur in the sand where thousands of turtles lay their eggs, as has happened for hundreds of thousands of years. Between La Flor and Chacocente, the two beaches that form the extremes of the Coral Corridor, visitors will find a number of bays and unique beaches known for their beauty and for various tourism facilities such as Ostional, Pie de Gigante, Guacalito of La Isla, Playa Amarillo and Morgan's Rock, among others, as well as dive sites like La Paloma and La Anciana.

In this book the reader will be introduced to the marine life of the South Pacific area of Nicaragua, better known as the Coral Corridor, a sample of the natural wealth that makes our country unique in Central America. Short texts will accompany underwater and landscape photographs taken by a new generation of Nicaraguan divers and researchers who want to show the beauty of their country to the world and invite visitors to enjoy this little piece of paradise located in the middle of the American continent, where visitors are received with open arms.

This publication has been made by the Nicaraguan Foundation for Sustainable Development, FUNDENIC SOS, and Fauna & Flora International, with the support of the Oceans 5 Foundation.

San Juan del Sur bay area

Artisanal fishermen starting his working day at sea

Boat-billed Heron *(Cochlearius cochlearius)*

Fishing boats in Ostional bay

Ostional fishermen

1.

The Coral Corridor.

Although its name evoques clear waters and extensive coral formations as in other parts of the world, the Coral corridor in Nicaragua is in reality comprised of rocky reefs, with presence of corals scattered through the area forming a patchy pattern. Visibility fluctuates greatly due to currents and abundance of plankton and nutrients and 3 meters visibility is considered good in these rich, full of life waters. The name Coral Corridor was coined by a group on Nicaraguan researchers and divers who documented first the presence of corals in this area, at a time when Nicaraguan south pacific was considered a region without any coral formations, which proved to be wrong.

School of Grunts
(Haemulonidae)

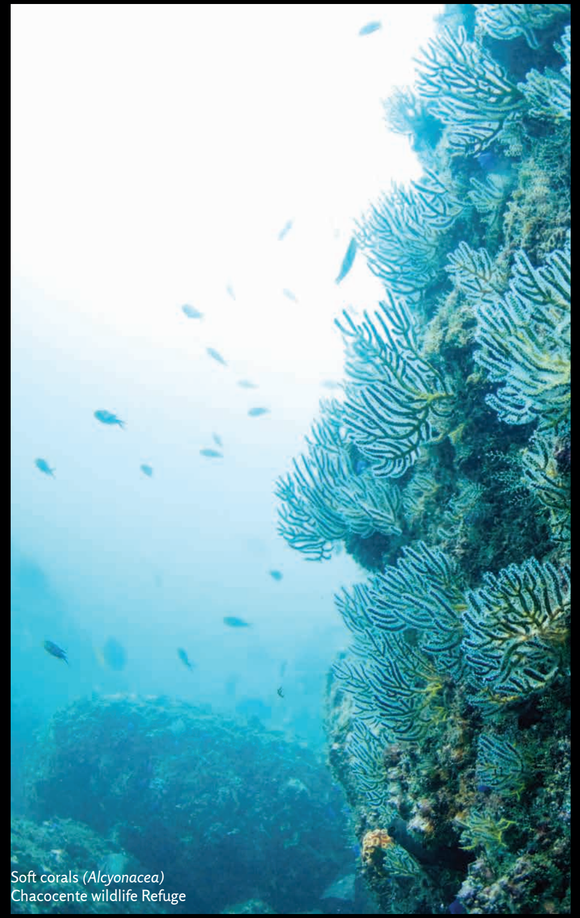
What makes it different from the rest of Nicaragua's Pacific coast?

The waters in this region are swept by easterly winds that cross Nicaragua through the great Lake Cocibolca area, without great mountains to interrupt them; they arrive at the Coral Corridor with such intensity that they push the warm surface water offshore, forcing cooler water loaded with nutrients up to the surface. It is this phenomenon of upwelling that makes marine life flourish in astonishing ways. Sunlight and nutrients in surface waters cause the development of large amount of algae, which constitute zooplankton food, leading in turn to increases in sea life. This phenomenon permits the existence of a pyramid of life, the basis of which is formed by algae and zooplankton and, at its vertex, by dolphins, sharks, five species of sea turtles and humpback whales.

The upwelling of cold waters rich in nutrients occurs seasonally, beginning around November each year. The process starts in waters near the coast, moving slowly seaward to a few hundred kilometers west of of Nicaragua and Costa Rica, where it remains stationary for many months. Scientists have discovered that the layer of cold water rising almost to the surface forms a kind of dome inside the sea, so this phenomenon has been called the Dome of Central America. At the bottom of this complex and rich ecosystem there are rocky reefs and the best samples of coral reefs found in the Pacific of Nicaragua. They provide shelter and food for many marine species, including hatchlings of commercial fish that supply the local seafood market. Fishing in Nicaragua is performed mostly in an artisanal way by families who own small boats with outboard motors fishing in coastal waters, and therefore Coral Corridor fish stocks are one of the strongest pillars of the local economy.

Due to the phenomenon of the Dome of Central America and the predominant rocky bottoms in the area, the waters of the Coral Corridor are more productive, cold and clear than the rest of the Pacific coast of Nicaragua

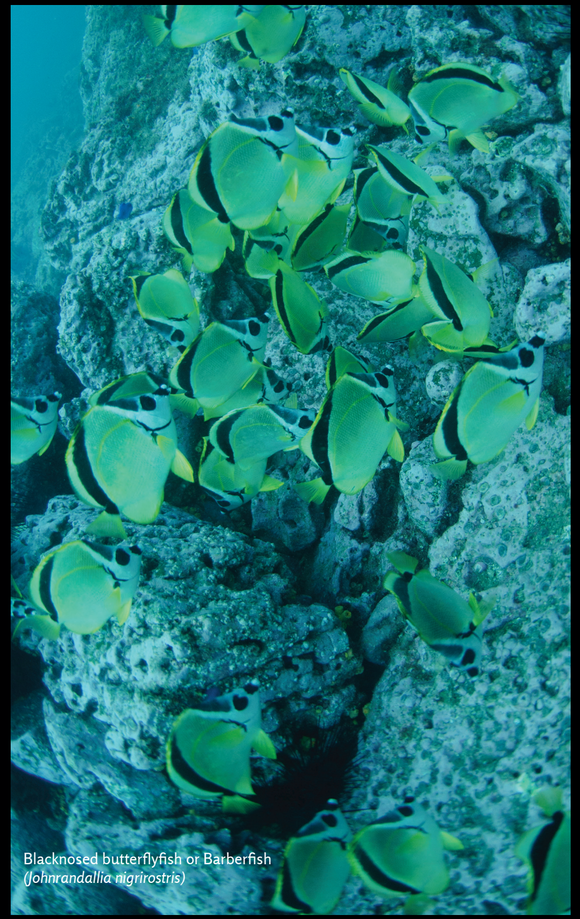
A Silvergray grunt *(Anisotremus caesius)* at the rocky bottom near El Toro, La Flor widllife refuge



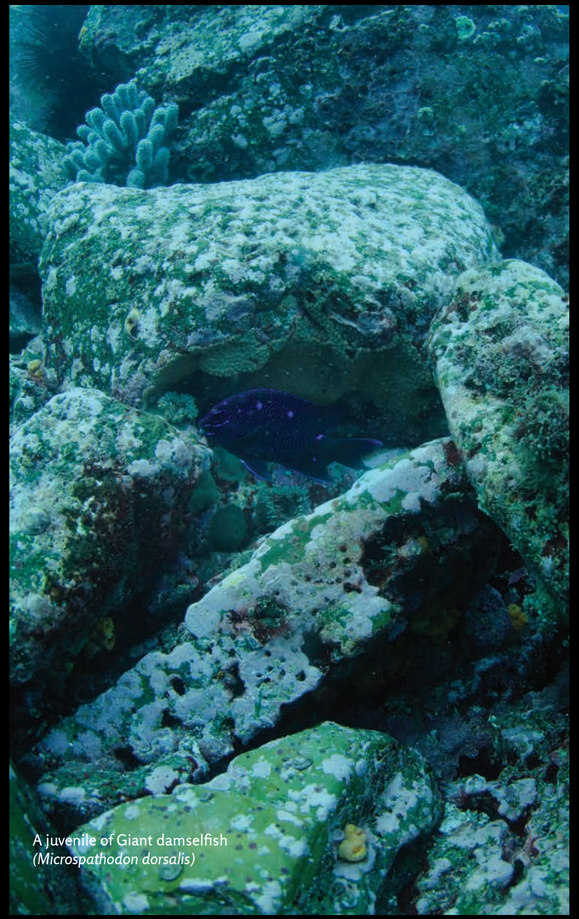
Soft corals *(Alcyonacea)* Chacocente wildlife Refuge

Soft corals *(Alcyonacea)*

Soft corals *(Alcyonacea)*



Blacknosed butterflyfish or Barberfish
(Johnrandallia nigrirostris)



A juvenile of Giant damselfish
(Microspathodon dorsalis)

Spotted sharpnosed puffer
(Canthigaster punctatissima)

Hourglass moray *(Muraena clepsydra)*
looking at some rainbow wrasses
(Thalassoma lucasanum)

The Coral Corridor, a forced stop for whales.

The phenomenon of the Dome of Central America, strongly influences the offshore waters of the South Pacific of Nicaragua. The resulting wealth in Krill (food for many whales) makes it a site of visitation and prolonged stay for globally threatened marine species. The Blue Whale (Balaenoptera musculus), for example, is the largest living mammal in the world and currently there are only 9 populations from which it is estimated 3,000 individuals are in the eastern North Pacific, representing the largest population on earth (Calambokidis and Barlow, 2004). Studies conducted in early 2000 showed that over 90% of the sightings of blue whales were conducted in only two places: along Baja California and around the Dome of Central America. Hence, scientists believe that the Dome is an area of breeding and reproduction of blue whales in the North Pacific and therefore a critical habitat for the survival of this species.

While blue whales are located too far from the coast of Nicaragua to be seen, one particular species, the humpback whale (Megaptera novaeangliae), is very close to the Coral Corridor coast and can be seen by visitors during a season of several months every year.

Humpback whales have for centuries appeared in the stories of sailors. The sight of these giant creatures launching from the water accounts for much of that attraction. The humpback whale may well be the origin of the myths of sea monsters. Even today, divers found in the vicinity of these whales say they feel disoriented, probably by the force of the notes of their songs resonating in the chest of those who listen.

In the Coral Corridor, two humpback whale-watching seasons go from January to April and from July to October. There are several tour providers such as the Reef Cooperative, formed by divers who once practiced commercial fishing but now are devoted to sustainable tourism offering specialized trips for whale-watching.

Spotted dolphins (Stenella attenuata) and common dolphin (Delphinus delphis) are other species of migratory marine mammals that are possible to see in the Coral Corridor. They come very close to the coast, following the schools of tuna that also ply these magnificent waters.

The Coral Corridor is also the right place to admire Olive Ridley turtle concentrations at sea, before they make their massive beach landings at La Flor and Chacocente. The massive nesting arrival season extends from August to November, with peaks in September and October every year.

Humpback whale
(Megaptera novaeangliae)

Humpback whales
near San Juan del Sur.

Playa Veracruz de Acayo, where it all begins for the largest sea turtle in the world.

Leatherback turtle (Dermochelys coriacea), is classified as critically endangered by the IUCN (International Union for Conservation of Nature). In Latin America, the greatest threats to this species are bycatch in high seas and the plunder of eggs for human consumption. In Nicaragua, in the early 80s, there were reported up to 1,000 Tora Turtle nesting females on the beaches, primarily in the Coral Corridor area. Today, the annual number barely reaches 50 individuals across the whole Nicaraguan Pacific coast.

The country makes every effort to protect the scarce leatherback turtle nests that are found each year in different beaches, several located in the Coral Corridor. the Leatherback turtle (called in Nicaragua, Tora) prefers secluded beaches, abundant coastal vegetation and a steep slope. Such is the case of Veracruz Acayo beach in the north end of Chacocente Wildlife Refuge. In this lonely and rugged beach, biologists and community come together each year to protect the turtles that come to complete their nesting process. Since 2002, the organization Fauna & Flora nternational is leading a conservation project together with private owners, the Ministry of Environment and local communities to protect this world treasure. The eggs are collected and taken to a nursery under constant guard, where the sand temperature is monitored and the amount of light is regulated, following a strict protocol that seeks to achieve the birth of as many hatchlings as possible. Afterwards, hatchlings are released into the sea where they start their perilous journey to the west, reaching the Dome of Central America, a shelter where they will spend their first years of life; later, as adults, they will return to nest on the same beach where they were conceived.

Olive Ridley *(Lepidochelys olivacea)*
Preparing to lay its eggs at La Flor beach

Community patrol members retrieving eggs from a Leatherback turtle. They'll relocate them to a hatchery safe from poachers, where they will be protected until they hatch and get released to the sea.

Olive Ridley newborn
(Lepidochelys olivacea)

Community patrol releasing newborn turtles.

Green turtle *(Chelonia mydas)* born in Veracruz de Acayo FFI managed hatchery

FFI (Fauna & Flora International) field biologist Heydi Salazar and community coordinator Juan Manuel Berroteran, taking data from newborn turtles prior to their release to the sea. Records help biologists to study marine turtle populations over the long term.

Green turtle
(Chelonia mydas)

Community patrol memebers, exhuming unhatched eggs in nests rewly born

Community patrol member releasing newborn turtles into the sea

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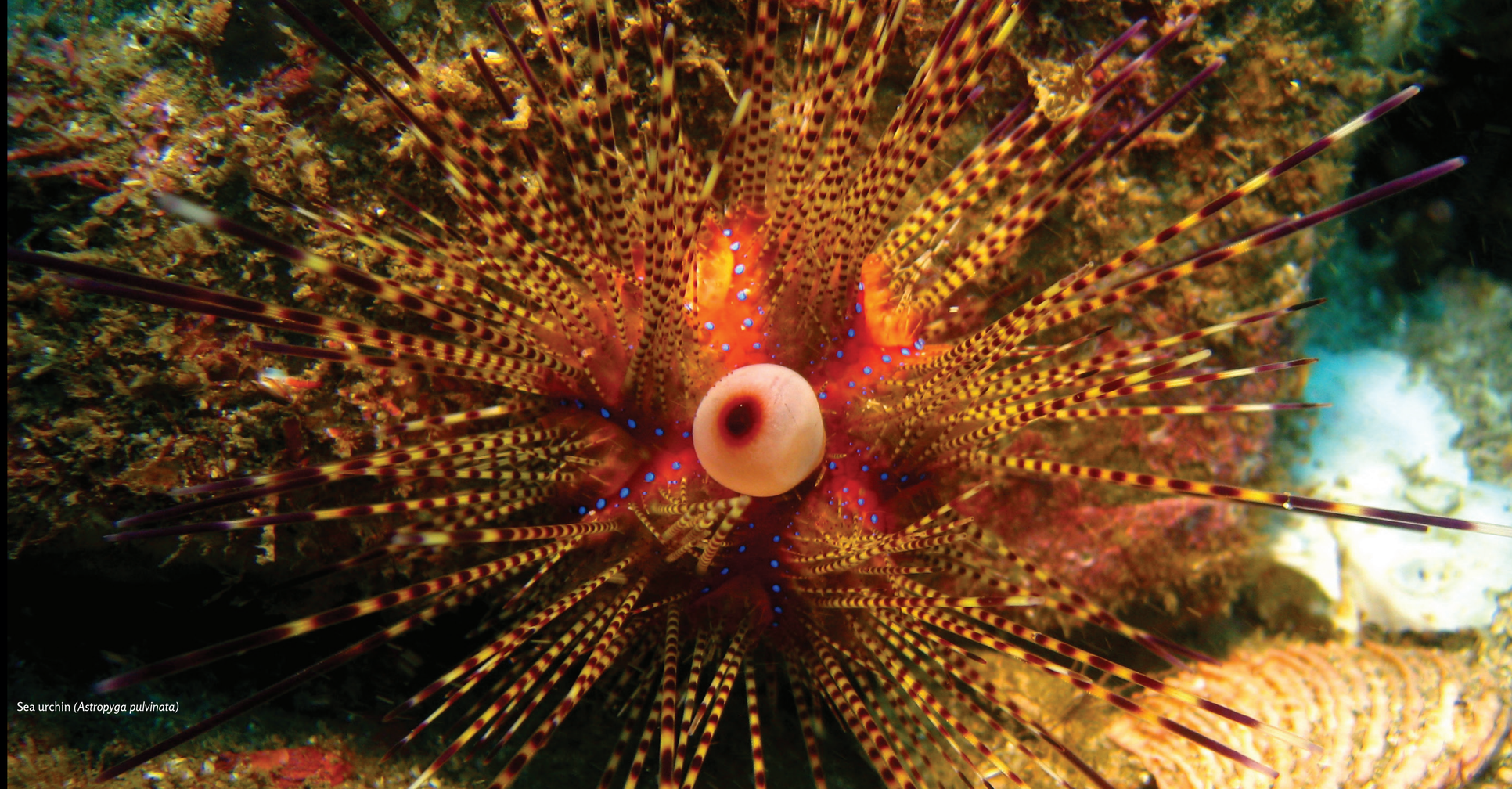
Protected areas of the Coral Corridor.



Sea urchin *(Astropyga pulvinata)*

Chacocente, a unique place in the world

Wildlife refuge Rio Escalante-Chacocente (its of ficial name), covers an area of 4, 645.3 hectares (46.45 km^2) of terrestrial ecosystems and additionally a sea area of 12 km long and 3.10 km offshore, equivalent to 37.2 km^2. It is located at the northern end of the Coral Corridor of Nicaragua. Farther north, the beaches become larger, the waters warmer, while the seabed is shallower and sandier. However, in Chacocente there still prevails the influence of the Central American Dome. Its sea bottom is rocky with significant presence of soft corals. This makes it an excellent fishing area used by artisanal fishermen in the region and especially by the fishing community of Astillero town, adjacent to the wildlife refuge.

Chacocente's protected area is an isolated place, with little infrastructure developmen. It is thus home to one of the last and best remnants of the Central American tropical dry forest and probably the most endangered terrestrial ecosystem in the region. What is special is its natural state. These beaches are solitary and the forest that stretches as far as the sea and sand permit is natural. Wild ocean waves and the stunning wildlife scenes make this place an example of how the world was thousands of years ago, before man arrived to change the landscape.

School of cissortail damselfish
(Chromis atrilobata)

Staghorn coral *(Acropora cervicornis)*
in front of Chacocente beach

Staghorn coral
(Acropora cervicornis)

Olive Ridley *(Lepidochelys olivacea)*
Mating

In the marine area of Chacocente, a few miles from the coast, Olive Ridley turtles congregate before heading to lay their eggs on the shores. They remain offshore for mating and feeding, only to make a massive beach landing when the time is right. A female turtle can repeat this process up to three times in the same season. Each year this natural cycle plays out as it has for tens of thousands of years. This refuge is also the nesting site for the nearly extinct Leatherback turtle (Dermochelys coriacea). A mature Leatherback turtle can nest from six to 14 times in one single season, a fundamental strategy for their survival.

On land, in the dry forest of this region, it is possible to find almost all representative species of this ecosyste. Yet it is the most threatened in Central America, as are the natural phenomena and processes that characterize it. One of these processes in particular is what occurs after a massive arrival of turtles on the beach: sometimes turtles lay their nests in places that are flooded by a strong tide whose waves remove the sand and expose the eggs.Thus exposed, it causes species such as crabs, sea birds, coyotes and other wild animals to take advantae of the eggs as a protein source. A similar case happens when the hatchlings are born and before they reach the water, when hundreds become a meal for hungry predators. In this way the sea lends a significant amount of nutrients to terrestrial ecosystems

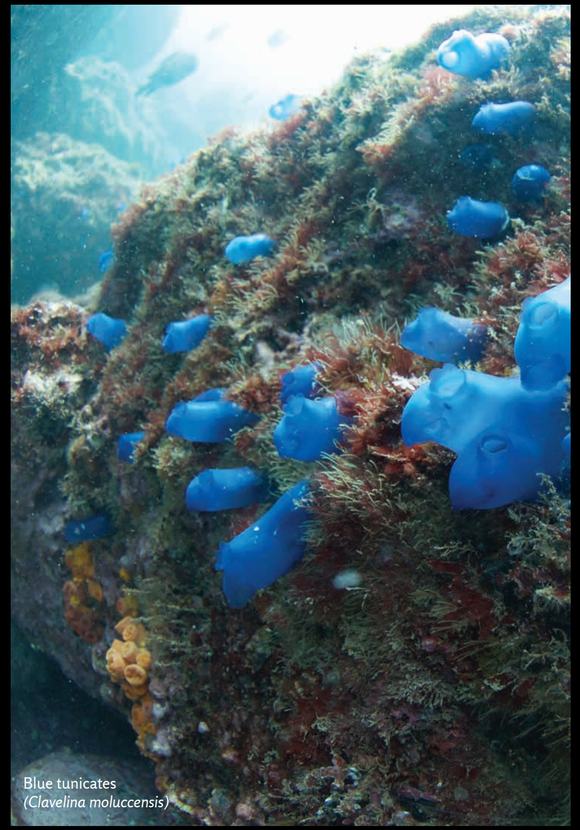
La Flor, a massive landing each year

The Wildlife Refuge La Flor is located 16 km from the town of San Juan del Sur. It is a protected area that covers almost 700 hectares of land and 7,874 hectares of sea. It is intended mainly to protect the massive arrival of turtle Olive Ridley (Lepidochelys olivacea) and sporadic nesting of three species of endangered sea turtles species: Chelonia midas agazzisi (Torita), critically endangered Dermochelys coriacea (Leatherback), which it is the world's largest sea turtle and the Hawksbill turtle Eretmochelys. imbricatta. In the waters of La Flor Wildlife Refuge it is possible to find oceanic migratory species such as marlin, humpback whales, eagle ray, swordfish and sailfish; in addition, several species of sharks, like the bull shark (Carcharhinus leucas), hammerheads and tiger sharks (Galeocerdus Cuvier) among others.

To the right Playa la Flor,
to the left playa Brasilito

Olive ridely
(Lepidochelys olivacea)
Nesting at La Flor Wildlife refuge

Rust guard crab
(Trapezia ferruginea Wolf)



Blue tunicates
(Clavelina moluccensis)

Colonial sea squirts, or tunicates, possibly
Didemnidae family near la Anciana Islet

Blue/Red tunicates, or sea squirts. These organisms are related to vertebrate animals according to scientist. In fact they are classified as the simplest form of chordate animals because on their first stage of life as a larvae they possess and ocellus (a primitive eye), a cerebral ganglion, or primitive brain and a notochord , a primitive spinal cord. After a very short period of time, the larvae finds a suitable rocky surface to which it anchors itself and begins its metamorphosis into its sessile (non-mobile), tube-like adult form.

La Anciana, a submerged jewel in the Pacific of Nicaragua

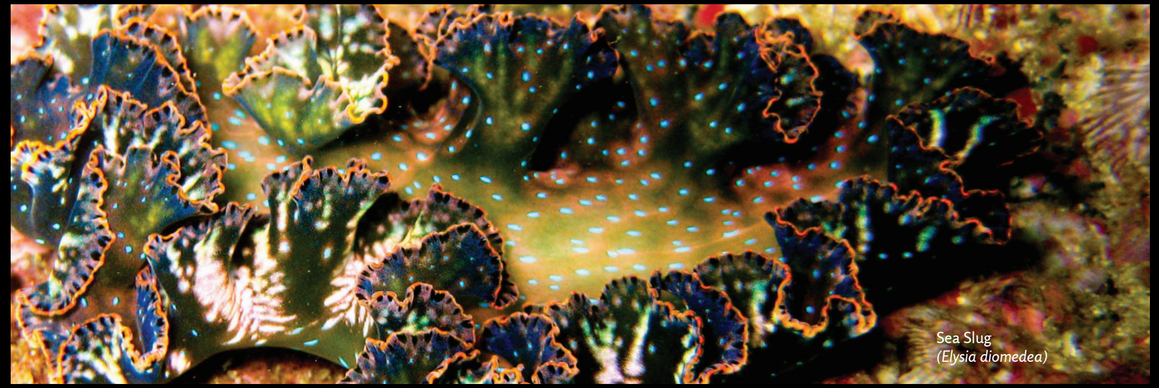
In the Coral Corridor there is an islet called La Anciana, the Coral Corridor there is an islet called La Anciana, (The old lady). It is a small, uninhabited islet located a few hundred meters from the coast of Guacalito near the La Isla beach & hotel. The island and its surrounding waters have been declared a protected area by the Municipal Government of Tola. The surrounding waters are, according to experts, a delicate marine ecosystem. The sea portion is located between the island and mainland. It is shallow, protected from currents and winds, and its bottoms are rocky, creating an excellent refuge for a multitude of species in their early stages of development. The site is also home to lobsters, pearl oysters and especially a coral reef located about five meters deep at the shallowest parts and easy to observe with just snorkel and fins.

The reef of La Anciana also has hard corals (Pocillopora sp.), soft corals and a corresponding collection of beautiful and colorful fish swarming through the reef.

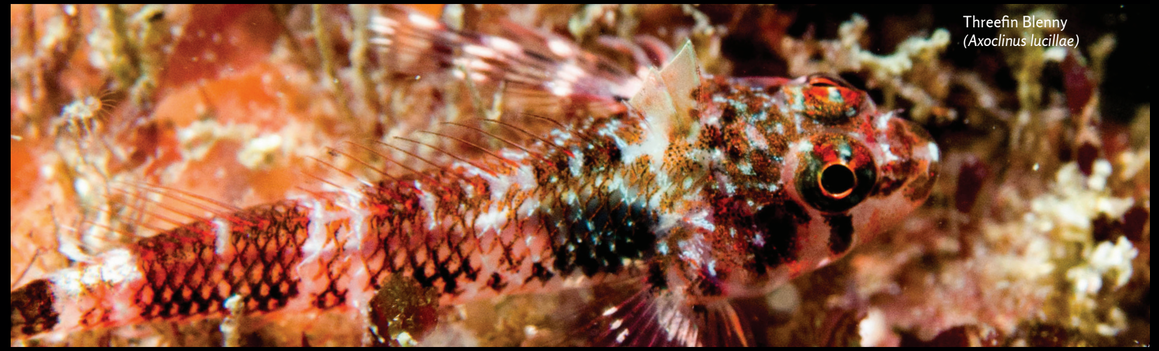
The marine ecosystem around La Anciana islet has the particularity of being formed by rocks protruding from the sea surface and shallow rocky bottoms, which when combined with the waves and currents creates an over-saturation of oxygen in the water. This is due to the currents and turbulence generated by the waves breaking against the rocks. This same turbulence serves as transportation, concentration and subsequent fixing of larvæ and fry of various organisms with little mobility, which attach to the rocks below—such as corals, macroalgae, molluscs, anemones and similar species.

Hancock's blenny
(Acanthemblemaria hancocki)

Lobster
(Panilurus gracilis)



Sea Slug
(Elysia diomedea)



Threefin Blenny
(Axoclinus lucillae)

Colonial sea squirts or tunicates
(Didemnidae)

Anemone
(Actiniidae)
Anemone from Actiniidae family

Sea Slug
(Elysia diomedea)

La Anciana iis therefore a mosaic of fragile organic micro -habitats formed by a variety of species of coral of unique nature. We can understand this islet as a veritable nursery of the many marine species that inhabit the Coral Corridor. All of these conditions, combined with the presence of a hard substrate formed of rocks, gravel, coarse sand and seashells, provide a unique refuge that sustains all life of the sea dwellers within.

Fishermen who live in communities near La Anciana, recognize its importance as nursery area and as one of the favorite spots for scuba diving and snorkelling by visitors

3.

Some specific sites of the Coral Corridor.

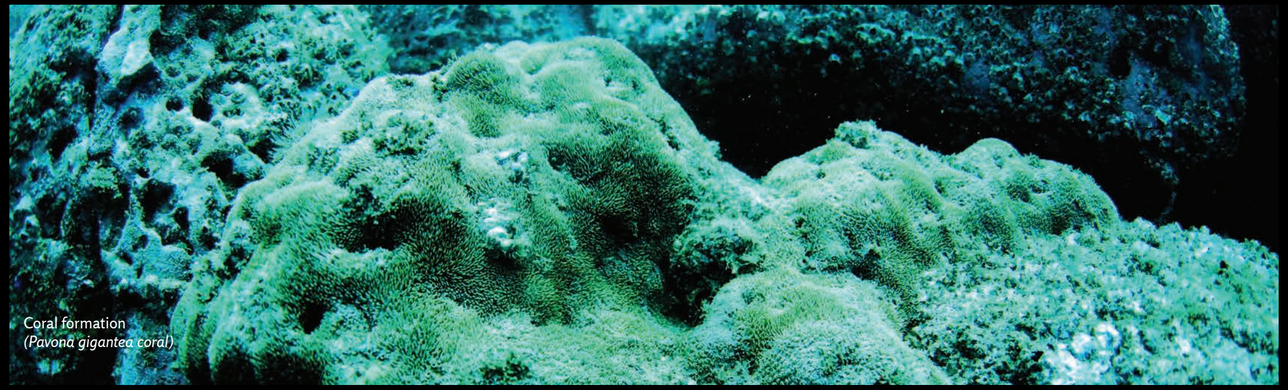
Acanthembiamaria Exilispinus

El Ostional: The place of the rocky reefs.

El Ostional is a coastal town located at the southern end of the Coral Corridor in the municipality of San Juan del Sur and the department of Rivas. It is 170 kilometers (105miles) south of Managua and 10.5 kilometers (6.5 miles) from the border between Nicaragua and Costa Rica. It owes its name to an important oyster bank located near the beach. The sector of the sea near the village has rocky bottoms that allow for the abundance of reef fish, currently exploited for the aquarium trade. Fishing by free diving is an important local activity, especially among young people who call it "pulmoneo" (lung-ing).

The Ostional, years ago, used to be a small town dedicated to agriculture, livestock and fisheries, but in recent years has taken a significant turn towards rural tourism. Today, it is recognized as a picturesque place ideally suited for volunteer tourism, sport fishing, diving, bird watching, turtles, dolphins and whale-watching. It is a vacation spot for Nicaraguan families and foreign tourists interested in being immersed in the life of a rural community.

Ostional beach



Coral formation
(Pavona gigantea coral)

Puffer fish
(Diodon holocanthus)

Mangrove forest near Ostional beach.

Ostional fishermen preparing their gear.

La Paloma

In the Coral Corridor there are many interesting places to practice scuba diving or snorkelling. One is La Paloma, ideal for scuba diving, where it is possible to find rocky walls full of life only 10 meters from the surface. The sensation experienced by the diver is to be immersed in a giant aquarium. Some of the most colorful species of reef fish can be seen in this area on their natural habitat. The “Barco Ruso” (Russian Ship). There is an interesting shipwreck called by the locals the Russian Ship. It’s supposedly a Russian-made fishing vessel that crashed against a rocky reef and sank after failing to reach San Juan del Sur’s port during the 80s. The place is not far from La Paloma and is located some 20 meters deep.

Haller’s round ray
(Urobates halleri)

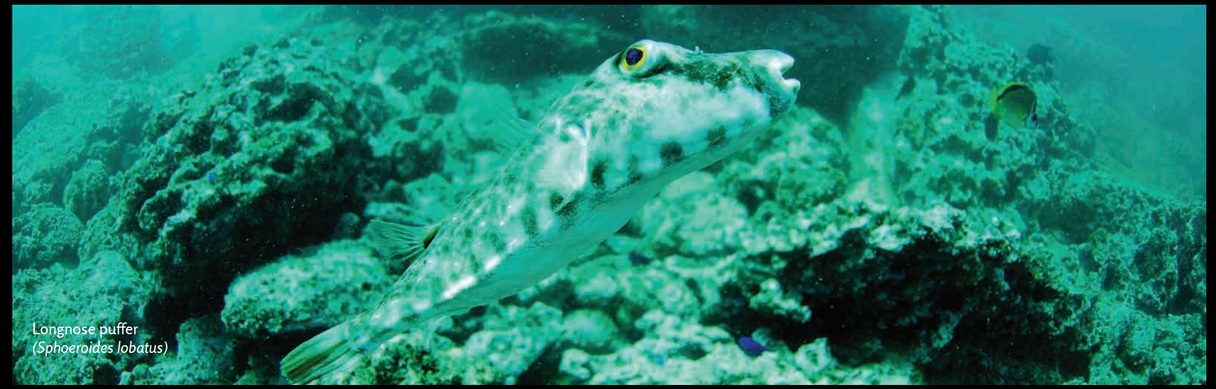
Soviet era fishing shipwreck near La Paloma

School of Grunts
(Haemulidae)

Corals in Gigante bay

Slate pencil urchin
(Eucidaris thouarsii)

A school of Grunts.
(Anisotremus caiesus & Haemulon maculicauda)



Longnose puffer
(Sphoeroides lobatus)

Gigante

It is the the ideal place for the people who coexist with the sea. The community of Pie de Gigante owes its name to one of the cliffs located at the southern end of the bay around which the community is settled. Fishermen say from the sea the cliff resembles the foot of a giant.

The underwater life in this vibrant bay is also a community of fishermen which coexists with tourism businesses in the area who specialize in the sport of surfing. The adjacent beach, Amarillo, is a particularly popular place with good waves for surfers that comes from the world over to enjoy its spectacular waves and nature. Fishermen from Gigante have always known they live in a privileged place. They do not have to sail long distances to reach their fishing grounds, and they know precisely which type of fish can be caught in each season according to the wind, water temperature, color and currents.

Along with conservationist organizations, they have proposed to the government a special area of community management, called by the fishermen a “Life and Development zone”. In this area they have designated no-take zones that will act as nursery areas to allow the species to reproduce. They are also clear about what type of gear to use and which time in the year is necessary to stop fishing for a particular species to enable its reproduction. All of this traditional knowledge, along with scientific research carried out by NGOs and individual researchers, has united to produce the first proposal in Nicaragua of a protected marine area managed by the fishermen themselves. If they succeed in getting of ficial recognition of the area, a first step will be achieved to ensure that over time a very important part of the Coral Corridor is preserved.

Gigante fishermen helped by their family members
to retreive a boat from the sea after the journey

Red snapper *(Lutjanus peru)*
one of the most important commercial species
for local fishermen.

A beautiful sunset at Gigante beach

Astillero

Astillero is a fishing village that emerged during the years of the revolution in the eighties. It was founded by some Nicaraguan biologists and planners working in those years in the newly created Institute of Natural Resources and Environment IRENA. The idea was to bring together various fishing families scattered across a region that lacked roads and basic services such as schools and electricity, then reunite them in a safe place where they could organize and engage in fishing. Thus, their basic needs such as education and health could be met by the government of that time.

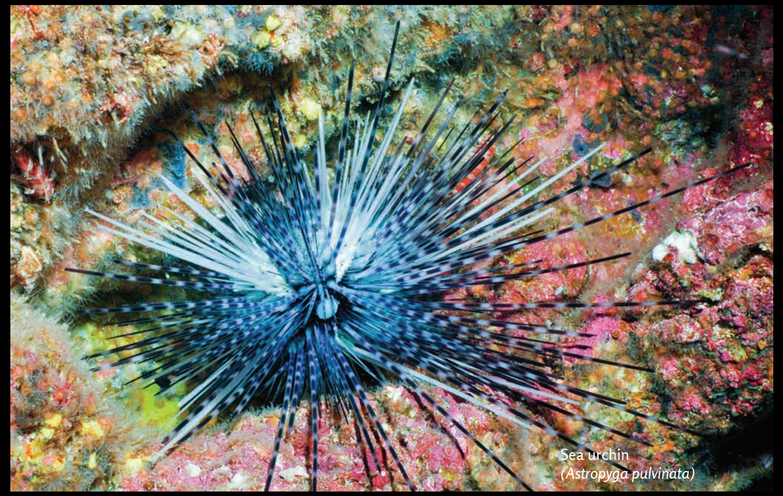
The first families of fishermen were convinced to settle in the bay known as Astillero. From that moment,the town began to grow, and currently has some 160 fishermen. Astillero reports some of the highest volumes of artisanal fisheries throughout the Coral Corridor area, fishing being the main commercial activity of its inhabitants. It is important to mention the waters of Astillero are reported to be the site with the greatest number of sharks in the area of the Coral Corridor, probably due to the abundance of food. It often has less visibility than the rest of the Coral Corridor, owing to vigorous bottom currents that carry sediment from the coast or from the extensive sandy bottoms located in the northern vicinity.

There are several hotels and tourism local providers that offer fishing trips and visits to the adjacent Chacocente wildlife refuge and its marine turtle nesting beaches.

Baseball is the most popular game among the kids

Collecting firewood at Astillero beach

Sea Cucumber
(Isostichopus fuscus)

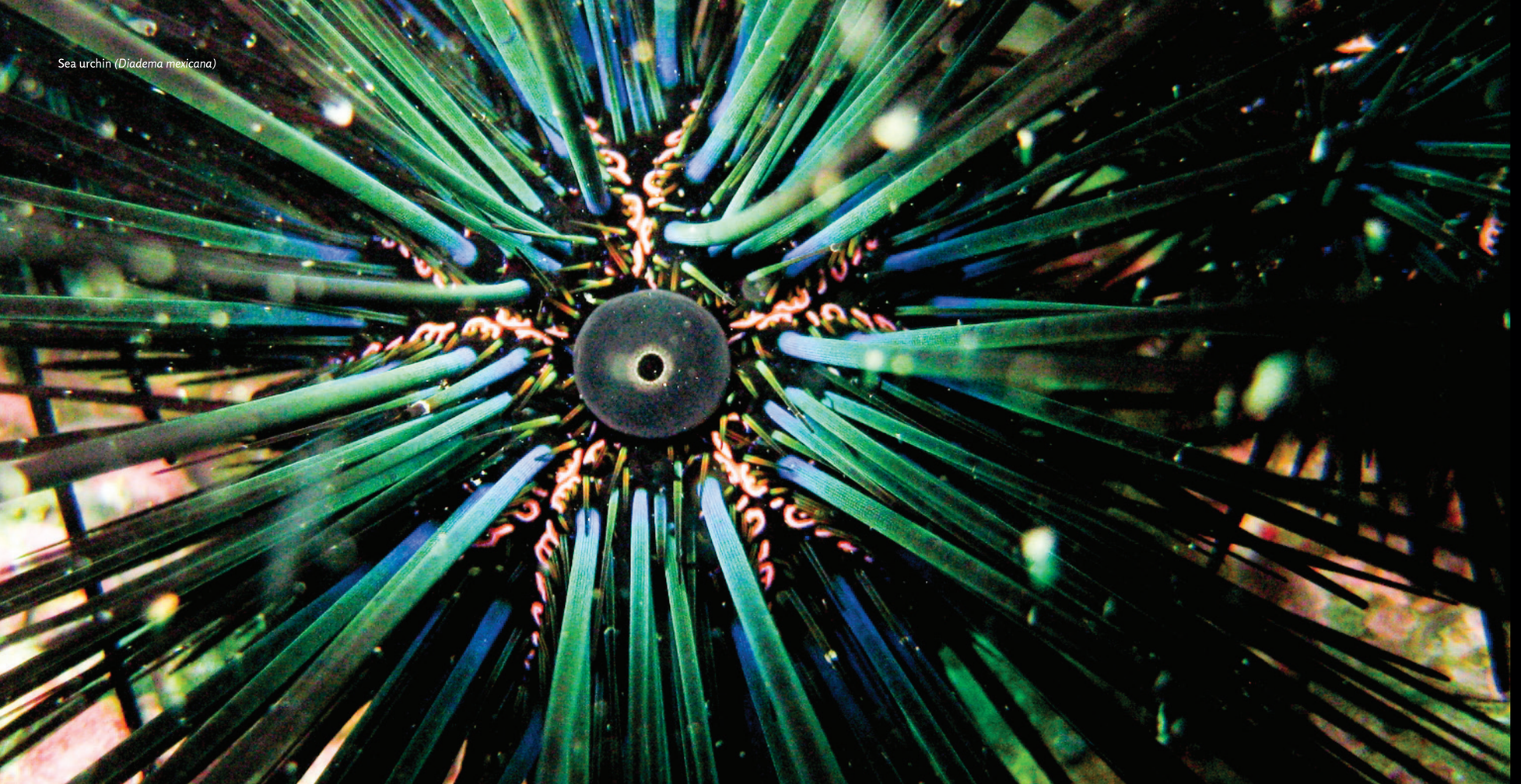


Sea urchin
(Astropyga pulvinata)

Slate Pencil Urchin

Epinephelus labriformis

Juvenile Stegastes flavilatus



Sea urchin *(Diadema mexicana)*

... And finally

The Coral Corridor is a region that is worth knowing, admiring and preserving. It contains coastal, terrestrial and marine ecosystems still in a good state of preservation and which boast amazing natural beauty like few places in Central America. Beautiful beaches and clear warm waters areas, massive arrivals of sea turtles, coral reefs, abundant fishing and the warmth of its people make this region a sample of what Nicaragua can offer to the world

Not everything is rosy though. Tourism development sometimes breaks environmental regulations, such as businesses who build illegally in the heart of the Protected Area Chacocente, or bad fishing practices like fishing with bombs or the excessive use of driftnets. These practices threaten the fragile balance in the region and what still survives of nature in these areas. It remains necessary to support efforts to continue conserving these natural beauties byrespecting environmental regulations. Visitors, too, must become informed before in places where a disregard for environmental regulations threaten natural processes such as mass arrivals of sea turtles near the beaches. In this way, tourists can also do their part.

If you are interested in helping, you can also collaborate with organizations fighting to preserve nature in Coral Corridor.

FUNDENIC SOS is a Nicaraguan non-profit organization whose mission is to protect natural resources, especially water, with a comprehensive vision using innovative forms of conservation and environmental education.

Fauna and Flora International has more than a decade of collaboration with different Nicaraguan organizations and institutions in the implementation of a sea turtle conservation program and a marine conservation program that works together with fishermen. They seek to ensure best fishing practices and better management of coastal and marine protected areas in the region. FFI's vision is a sustainable future for the planet, where biodiversity is effectively conserved by the people who live closest to it, supported by the global community.

Diversidad marino-costera

A lo largo de una franja costera de 80 kilómetros, en línea recta, que se extiende mar adentro hasta unas 12 millas náuticas en el Pacífico Sur de Nicaragua, se haya una de las áreas más ricas y productivas de la biodiversidad marina centroamericana. La zona denominada Corredor del Coral, constituye la primera muestra documentada de la existencia de formaciones coralinas en el litoral del Pacífico nicaragüense, antes solo atribuidas al Mar Caribe.

La dinámica ecológica asociada a las aguas frías y al fenómeno de surgencia desde el fondo marino, frente a las costas de los municipios de San Juan del Sur y Tola en el departamento de Rivas, propicia la generación de nutrientes y la calidad de los ecosistemas en el Corredor del Coral, mismo que cumple funciones de conectividad biológica entre arrecifes rocosos y coralinos, playas arenosas, costas rocosas, estuarios y farallones o acantilados que constituyen el hábitat de numerosas especies de fauna y flora marino costera.

Ésta franja, integra a 3 áreas protegidas: Zona Marina de Vida y Desarrollo "Gigante"; y los Refugios de Vida Silvestre Río Escalante - Chococente, y La Flor.

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Es una de las siete playas de toda la costa del continente americano donde ocurren anidaciones masivas de tortugas marinas, llegando en una noche hasta 3,000 tortugas.

Anidaciones de cuatro especies de tortugas marinas: tortuga tora (*Dermochelys coriacea*), tortuga carey (*Eretmochelys imbricata*), tortuga torita (*Chelonia mydas*) y tortuga paslama (*Lepidochelys olivacea*), todas en peligro de extinción.

Ocurren procesos reproductivos, de crianza o de desarrollo de diversas especies marinas de interés económico para las pesquerías. Especies: langosta (*Panulirus gracilis*), pulpo (*Octopus sp.*), pargo rojo (*Lutjanus colorado*), loro (*Scarus perrico*), meros (Serranidae), pepino (*Isostichopus fuscus*), ostras (*Pinctada mazatlanica*), gambute (*Strombus galatea*).

Habitat y refugio ecosistémico para reproducción, desove, y/o alimento de crías. Se ha constatado la presencia de alevines y juveniles de langosta (*Panulirus gracilis*), pargo cola amarilla (*Lutjanus argentriventis*), pargo roquero (*Holopagrus guentheri*), y camarones (*Litopenaeus spp.*).

El sitio más importante en el litoral del Pacífico nicaragüense para la anidación masiva de la tortuga paslama (*Lepidochelys olivacea*). En una sola temporada de anidación se han registrado más de 80,000 tortugas desovantes. Una arribada de 4 a 8 días llega a concentrar más de 25,000 mil tortugas.

Además de anidar en las costas del Refugio, las tortugas se agrupan frente a las aguas del Pacífico para alimentarse y aparearse, por tanto, los arrecifes del Refugio son igual de relevantes para la conservación de las tortugas como las playas de anidación.

Servicios Socioecosistémicos

1. Hábitat de especies marinas residentes y migratorias: ballena jorobada (*Megaptera novaeangliae*), delfín (*Stenella atenuata*); manta rayas (*Manta sp.*), raya águila (*Aetobatus narinari*); tiburón toro (*Charcharinus leucas*), tiburón tigre (*Galeocerdus cuvier*), tiburón azul (*Prionace glauca*) y tiburón martillo (*Sphyrna sp.*); pez vela (*Istiophorus platypterus*), pez espada (Xiphias gladius), marlins (*Macaira nigricans, y Tetrapturus audax*).

2. Sitio más importante de congregación y apareamiento de tortugas marinas previo al desove en las playas de La Flor y Chococente, así como área refugio de tortuguillos.

3. Pesca artesanal (seguridad alimentaria) y deportiva.

4. Actividades de investigación, educación e interpretación, ecoturismo y recreación.

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