Issue 14 April 2020
ISSN 2052-5273

Special edition: The UN Decade on Ecosystem Restoration

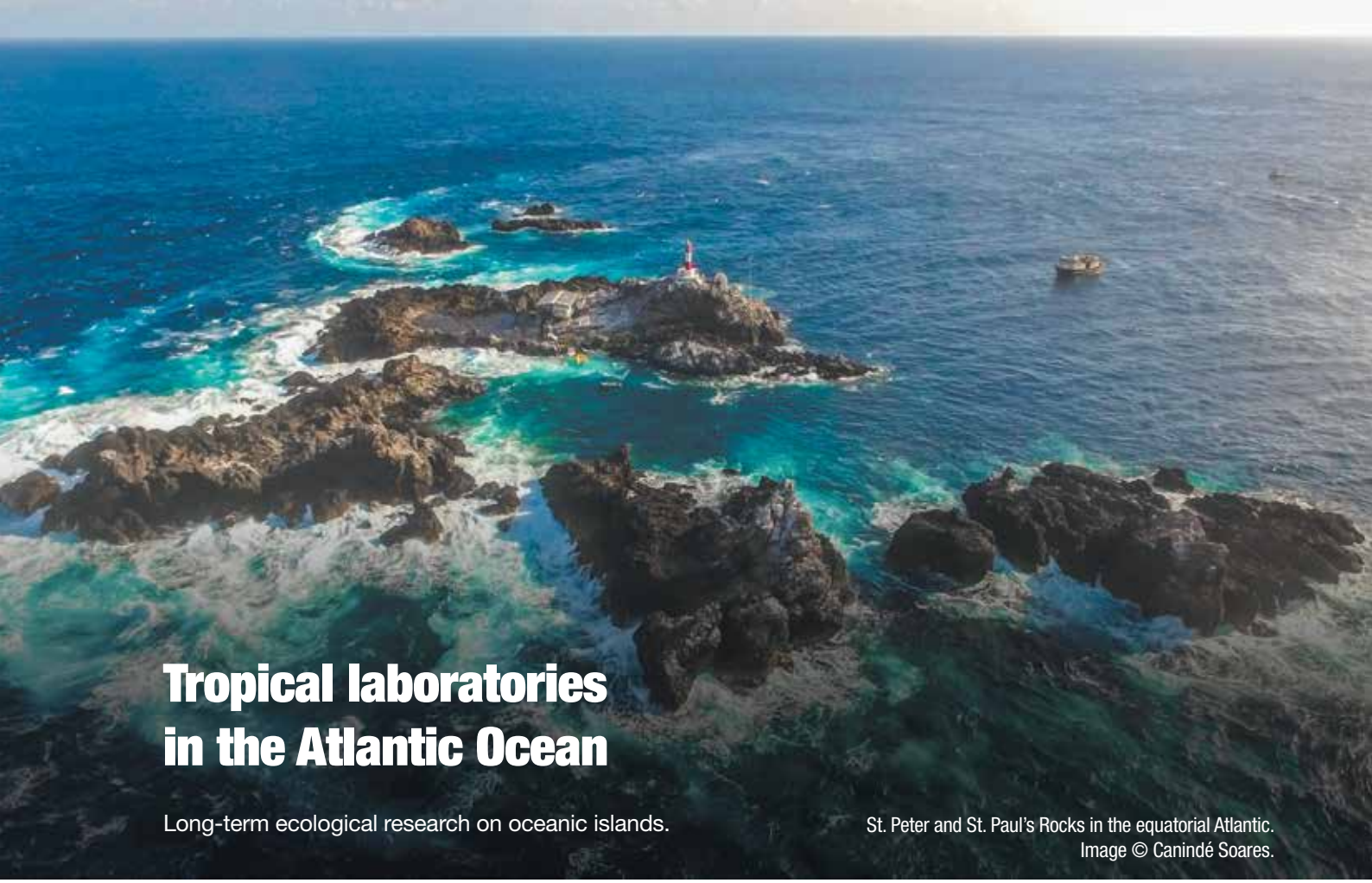
The Marine Biologist

The magazine of the marine biological community

Coral restoration in a warming world
Mangroves: the roots of the sea
A sea turtle haven in central Oceania

THE MARINE BIOLOGICAL ASSOCIATION
Est. 1884
Incorporated by Royal Charter

Climate emergency: are we heading for a disastrous future?
Tropical laboratories in the Atlantic Ocean | Environmental change and evolution of organisms



Tropical laboratories in the Atlantic Ocean

Long-term ecological research on oceanic islands.

St. Peter and St. Paul's Rocks in the equatorial Atlantic. Image © Canindé Soares.

Less exploited and less studied than the continental coast, Brazil's beautiful Atlantic islands are the subject of long-term ecological research. By **Lucas Nunes** and **Sergio Floeter**.

Brazil has one of the longest coastlines in the world, encompassing environments such as mangroves, sand beaches, and biogenic and rocky reefs. Among these marine environments, Brazil's oceanic islands stand out as the least exploited and least studied examples. These isolated tropical islands hold a distinctive fauna and flora, including several endemic species and a large biomass of pelagic fishes, thus offering a great opportunity for marine scientists to explore scientific questions and test ecological hypotheses.

Formed mostly by volcanic activity, oceanic islands are isolated from the continental shelf and often possess water transparency greater than 50 metres. These unique environments are a kind of marine 'oasis' with abundant food resources, breeding areas, and refuges in which reef organisms can thrive in a vast, otherwise oligotrophic (nutrient-poor) ocean. Another singular characteristic of oceanic islands is their high number of endemic species (those only found in a particular location). These islands are perhaps the last 'pristine' marine environments that we have on Earth, being the only places where large biomass of fishes and apex predators, such as sharks, still abound (Fig. 1).

1 http://peldiloc.ufsc.br

In the Atlantic Ocean, four tropical oceanic islands belong to Brazil (Fig. 2). Their distance from the continental landmass makes them less affected by human impacts, such as pollution and overfishing, but it also makes them less known by the human population. Each of these islands has different characteristics, and, in 2013, the Long-Term Ecological Research of Brazilians Oceanic Islands[1] (PELD-ILOC) was set up to study these tropical 'laboratories'. Through long-term monitoring of fish, benthic organisms and coral (see Fig. 3), PELD-ILOC plays a fundamental role in understanding the processes

Figure 1. The lemon shark (*Negaprion brevirostris*) in a nursery site on Rocas Atoll. Image © Lucas Nunes.

and dynamics in these relatively pristine ecosystems.

Each year, a small group of Brazilian researchers have the opportunity to visit these beautiful islands, where they sample different organisms and collect data. The adventure starts in the laboratory with detailed expedition planning, and then, after a boat journey of several days, we arrive in the warmth and sunshine of these paradise islands. Each island has a scientific station equipped with accommodation and research facilities, but in general potable water and food supply must come from the continent.

Long-term monitoring enabled us to record a coral bleaching event during 2016 due to water temperature anomalies (Fig. 4). The same event was responsible for massive coral bleaching in several coral reefs worldwide including the Great Barrier Reef in Australia. We can also detect fluctuations in fish populations over time. Dr Carlos Ferreira said, 'We are seeing that the population size of some reef fishes seems to be correlated with warming years, some species declining and others increasing after an 'El Niño' warm season, but many times these changes have a delay of one or two years before they are detectable.' In addition, sharks that are highly exploited by fisheries on the coast are thriving in these isolated islands, where nursery sites are protected.

Dr Sergio Floeter said, 'Together, the four Brazilian oceanic islands harbour 24 endemic reef fish species. Despite their isolation from each other, the islands are more connected among themselves than with the coast, mainly due to shared characteristics such as temperature, productivity, and high-water transparency. For example, the small and remote St. Peter and St. Paul's Rocks share endemics with Fernando de Noronha and Rocas Atoll, as well as with Ascension and St. Helena oceanic islands, in the Mid-Atlantic Ridge.'

In addition to this focus on research, the mission of PELD-ILOC is to increase awareness and interest among Brazil's population. Thus, for the future, we hope to continue the sampling effort and look forward to greater interaction between the population, scientists and the government to preserve the biodiversity of these unique marine ecosystems.

Lucas T. Nunes (nuneslteixeira@gmail.com)
Professor Carlos E. L. Ferreira (carlosferreira@id.uff.br)
Dr Sergio R. Floeter (sergiofloeter@gmail.com)

The PELD–ILOC is led by Prof Dr Carlos Ferreira with the participation of a large team of marine scientists of the Brazilian marine biodiversity network SISBIOTA-Mar see: http://www.sisbiota.ufsc.br

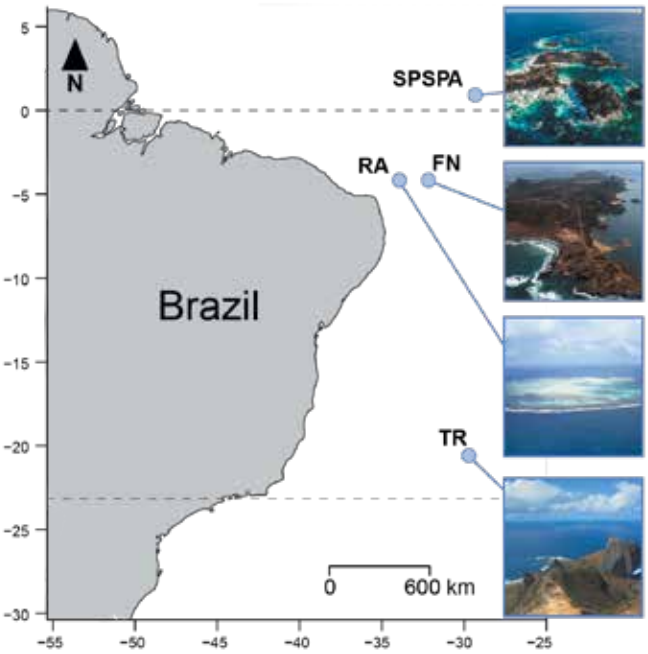


Figure 2. Brazil's oceanic islands. SPSPA: St. Peter and St. Paul's Archipelago © Canindé Soares; FN: Fernando de Noronha Archipelago © Sergio Floeter; RA: Rocas Atoll © Brazilian Navy; TR: Trindade Island and Martin Vaz Archipelago © Lucas Nunes.

Figure 3. Sampling the benthos for laboratory analysis. Image © Sergio Floeter.

Figure 4. Bleached coral colonies after the bleaching events of 2016. Image © Natalia Roos.

Issue 15: July 2020

The Marine Biologist

The magazine of the marine biological community