

CoralCarib: Pioneering a new strategic approach for conserving and restoring Caribbean coral reef ecosystems that targets Climate Resilient Refuges

| Coral Chronicles Quarterly Newsletter – November 2024 – 1st Edition

📍 **Cuba**

Coral Restoration Experiences shared at MarCuba 2024

During MarCuba 2024, a key event for marine conservation in the Caribbean, The Nature Conservancy's CoralCarib project brought together experts from across the region to exchange knowledge on reef restoration. In sessions hosted at the National Aquarium of Cuba and the Meliá Habana Hotel, CoralCarib representatives from Cuba, the Dominican Republic and the U.S. Virgin Islands discussed advances, challenges and lessons learned in coral restoration.

One of the highlights was the session on Design and Development of Coral Reproductive Laboratories, where Jessica Ward (TNC), Rebecca Garcia (Fundación Grupo Punta Cana) and Sergio Guendulain (FUNDEMAR) presented their experiences in the construction of laboratories in the U.S. Virgin Islands, Punta Cana and Bayahibe, respectively. These laboratories have been crucial to implement reproduction and restoration strategies in the region and will serve as a model for the new laboratory planned in Punta Perdiz, in the Zapata Swamp, Cuba.

The TNC Science team also led a session on modeling climate change refugia, where participants discussed the importance of avoiding initial mistakes to optimize the efficiency of these projects. More than 60 attendees from across multiple Caribbean countries learned about how climate refuge areas are selected.

The MarCuba sessions highlighted Cuba's advancements in reef health monitoring, sea turtle conservation and seagrass meadows. Throughout the conference, attendees shared experiences on the impact of projects such as "Mi Costa" on environmental awareness and education in local communities.

MarCuba 2024 provided a space to strengthen collaboration and learning around coral restoration in the Caribbean, reinforcing the commitment and teamwork of CoralCarib staff to advance coral conservation in the region.

60

attendees from across multiple Caribbean countries learned about how climate refuge areas are selected

Community-Driven Coral Restoration in Haiti

In Haiti, the CoralCarib project is making strides to restore coral reefs and unite communities. The Haiti Ocean Project team is committed to involving local fishers and youth in the coral reef restoration process. They're not only nurturing coral but also creating engagement based on shared knowledge and hands-on experience.

Recently, the Haiti Ocean Project invited local youth to join in constructing a coral nursery, designed to support coral growth and restore critical reef habitats. In a series of workshops, young participants learned to build coral trees using PVC pipes, piecing together each part of the structure, gaining a firsthand understanding of coral reef restoration.

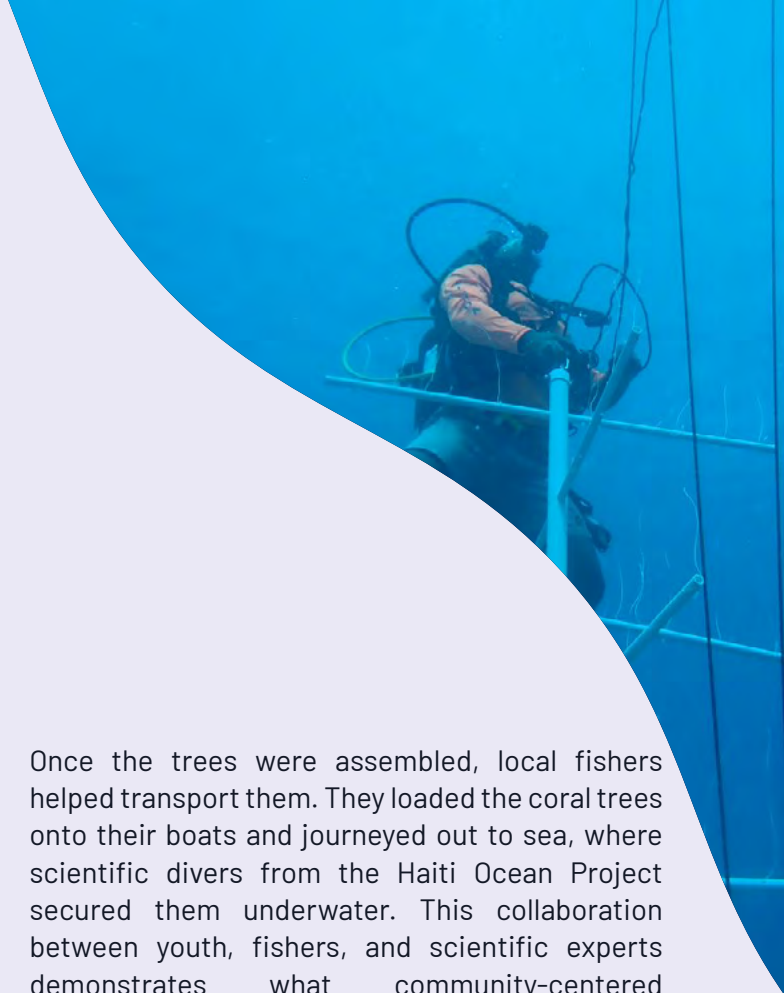
Once the trees were assembled, local fishers helped transport them. They loaded the coral trees onto their boats and journeyed out to sea, where scientific divers from the Haiti Ocean Project secured them underwater. This collaboration between youth, fishers, and scientific experts demonstrates what community-centered conservation looks like.

The project also organized workshops and outreach initiatives within nearby communities on the importance of coral reef restoration and how healthy coral ecosystems benefit local livelihoods, from fishing to tourism, while helping mitigate coastal erosion.

“

“The success of our coral reef implementation and restoration work in Haiti will only be possible by bringing together the local populations and allowing them to take part in activities,

said Jamie Aquino, Haiti Ocean Project president.



Q&A session on Baseline Insights and Algae Removal Efforts

What were the key findings from the baseline surveys that the CoralCarib Jamaica team conducted? How is the data from these surveys being used to guide coral restoration efforts?

The Jamaica team's baseline surveys revealed insights following a major coral bleaching event in 2023. They found that the populations of two main coral species, *Acropora palmata* and *Acropora cervicornis*, were hit very hard, with 99% mortality. However, another important reef-building coral species, *Orbicella faveolata*, showed more resilience, with about 90% of coral surviving the bleaching event.

They also observed young coral colonies, particularly on the East Portland reefs, suggesting that some coral is naturally regenerating even after significant stress events. Coral cover was higher in the center of the reef, which has prompted the team to plan restoration efforts in that area while exploring other parts of the reef. They also noted that a type of algae that helps coral larvae settle and grow is present under the dominant macroalgae, which offers foundation for new coral life.

This data will help the team target areas with the best potential for recovery and resilience, focusing their restoration work where conditions seem most favorable.

Why is algae overgrowth a significant problem for coral reefs, and what is the link between human activity and algae growth?

Algae overgrowth is a big problem for coral reefs because it makes it harder for corals to survive and grow back. Algae growth

- **Blocks Sunlight:** Algae can spread fast and form thick layers, blocking the sunlight that corals need.
- **Uses Up Nutrients:** Algae release nutrients that attract microbes, which then consume oxygen, sometimes harming the corals.
- **Crowds Corals Out:** Algae take up space on the reef, making it hard for new coral to settle and grow.
- **Stresses Corals:** Algae can physically and chemically harm corals by shading them, rubbing

against them, or smothering them. It also increases corals' susceptibility to disease.

How Humans Make It Worse:

- **Overfishing:** When too many algae-eating fish are removed, especially herbivorous fish, algae can grow out of control. This has been a problem in Jamaica since the 1970s.
- **Pollution and Nutrients:** Pollution and excess nutrients, like nitrates and phosphates from fertilizers, wash into the ocean from farms, especially around East Portland. Corals aren't adapted to these high nutrient levels, which can lead to more algae growth.

How do algae removal interventions benefit coral health in the long term?

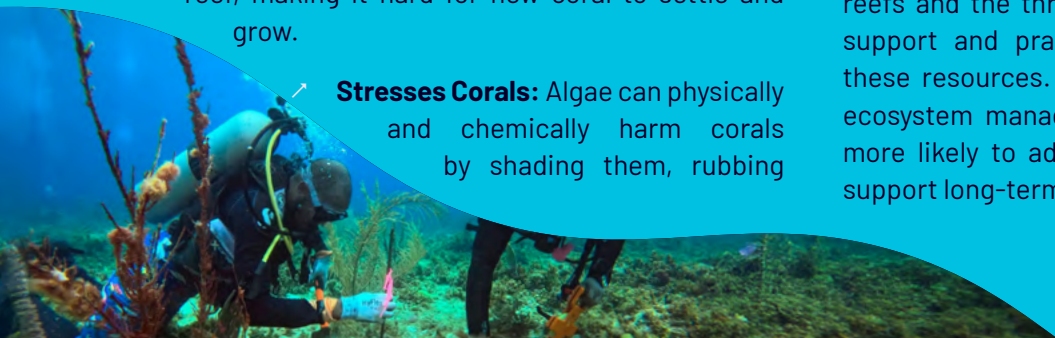
Removing excess algae from coral reefs is a simple but powerful way to help coral health in the long run. Algae removal:

- **Makes Space for Coral:** By cutting back the thick algae, corals have more room to grow and recover.
- **Boosts Reef Resilience:** Regular algae removal helps reefs stay stronger and more resilient, especially if combined with other restoration efforts.
- **Affordable and Replicable:** This approach is low-cost and easy to replicate, so it can be done on many reefs without breaking the bank.

In short, algae removal is a practical, budget-friendly tool that helps create a better environment for corals to thrive over time.

What role does education and outreach play in reducing practices that contribute to algae growth and damage coral reefs?

Education and outreach play a crucial role in protecting coral reefs by encouraging positive changes in individual and community behaviors that can harm these ecosystems. When people understand the value of coral reefs and the threats they face, they are more likely to support and practice sustainable habits that protect these resources. Public awareness also leads to better ecosystem management, as informed communities are more likely to advocate for policies and practices that support long-term reef health and resilience.



Comprehensive Efforts Across the Dominican Republic Result in Coral Spawning Success Despite Climate Stressors

Dominican Republic's coral reefs have long been a vital part of the country's tourism, biodiversity and the communities' livelihoods, but the battle to restore coral populations is at a critical tipping point. With the devastating impact of stony coral tissue loss disease and last year's mass bleaching event—which presumably disrupted coral reproduction cycles and marked the highest coral bleaching mortality in the Caribbean—local scientists and conservationists have had to act quickly and decisively.

The team, composed of technical experts from TNC, FUNDEMAR and Fundación Puntacana, dive centers, and dedicated local volunteers, came together to help restore these fragile ecosystems and capture as many spawning events as possible to contribute to the reproduction of corals.

Spawning is a critical period in the life cycle of corals when they release their gametes into the water, hoping for fertilization and the continuation of their species. At Fundación Puntacana, while some species such as *Acropora palmata* (elkhorn coral) successfully spawned and settled, others like *Acropora cervicornis* (staghorn coral), showed very weak reproductive events, likely a consequence of the stress caused by bleaching. For *Diploria labyrinthiformis* (brain coral), only a fraction of monitored colonies successfully spawned in the Punta Cana region, a stark contrast to previous seasons. Even those that did spawn seemed to have lower reproductive output, as bleaching events might have taken a toll on the corals' energy reserves, potentially compromising gamete development to complete their reproductive cycles.

When corals bleach, they lose their symbiotic algae, known as zooxanthellae. When this happens, corals will rely on heterotrophic feeding which only provides a small fraction of energy for their metabolic functions. In response, they reallocate all the energy necessary to accomplish reproduction toward repairing to enhance chances of survivorship.

FUNDEMAR, CoralCarib's local partner in Bayahibe said that in 2024, there have been some changes due to the thermal stress from warming waters. There was a noticeable shift in the timing of coral spawning, with changes in the month, days, and even hours. Also, with coral colonies now more spaced out than ever, gametes in the water are not dense enough to facilitate fertilization naturally. The team witnessed this phenomenon firsthand in the lab, where even the controlled fertilization attempts yielded low success





rates for *D. labyrinthiformis*. This is a reflection of the reproductive challenges corals are facing in their natural environment—where fertilization was only possible with what FUNDEMAR could manually capture and mix in small containers.

Despite this unpredictability, the team managed to successfully capture gametes, fertilize them in the lab, and produce baby corals. These young corals were then settled on substrates and transplanted back into the reef. This process, known as assisted coral reproduction, enhances the genetic diversity and resilience of coral populations, which is crucial for their long-term survival in the face of ongoing climate threats.

Due to these challenges, a low percentage of fertilization for some coral species (30-40%) has been observed in this year's spawning efforts. By comparison, a successful year would see fertilization rates closer to 80%.

However, thanks to a multidisciplinary team's efforts to boost coral reproduction, there have been successes in coral cultivation and fertilization, with 65% of

the gametes collected from some of the strongest spawning events being fertilized. Monitoring is ongoing and assisted sexual reproduction efforts show signs of hope, particularly for *Acropora palmata*, which has had some success in the region.

The CoralCarib project has played a major role by providing training and technical support, and equipping teams with new tools and techniques to improve coral spawning success. Neighboring regions like the US Virgin Islands have also launched significant coral restoration initiatives, sharing knowledge and strategies for increasing reproduction success rates. Through international cooperation, the project team is seeing improvements in methodologies, including life support systems for coral gametes and improved spawning calendars. With continued dedication, innovation, and the shared goal of protecting our oceans, we can help these vital ecosystems withstand climatic changes.

Coral Chronicles is a quarterly newsletter published by TNC Caribbean to highlight the progress of the CoralCarib Project.

Supported by:



based on a decision of the German Bundestag

The International Climate Initiative (IKI) is implemented by the Federal Ministry for Economic Affairs and Climate Action (BMWK) in close cooperation with the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and the Federal Foreign Office (AA).

