Monitoring and Management of Marine and Terrestrial Ecosystems in Guadeloupe Port Authority: Preliminary Results from 2022-2024

Surveillance et gestion des écosystèmes marins et terrestres au sein du Grand Port Maritime de Guadeloupe: Résultats préliminaires pour 2022-2024

Seguimiento y gestión de los ecosistemas marinos y terrestres en la Autoridad Portuaria de Guadalupe: Resultados preliminares de 2022-2024

SITA NARAYANAN
Guadeloupe Port Authority - Planning and Sustainable Development Department;
c- Quai Ferdinand de Lesseps – BP 485 – 97165 Pointe-à-Pitre CEDEX
baron@port-guadeloupe.com; narayanan@port-guadeloupe.com

EXTENDED ABSTRACT

INTRODUCTION

Guadeloupe, a French overseas region in the Caribbean, faces significant environmental challenges, exacerbated by climate change and increasing anthropogenic pressures. The Guadeloupe Port Authority (GPA), beyond its logistical and economic responsibilities, plays a crucial role in land-use planning and ecological stewardship. Since 2022, the GPA has implemented a comprehensive monitoring program focused on the health and resilience of marine and terrestrial ecosystems, such as coral reefs, seagrass meadows, mangroves, and anthropized habitats. This initiative aims to reconcile ecological conservation with port development activities.

METHODOLOGY

The monitoring program covers 12 sites across three ecosystems: coral reefs, seagrass meadows, and anthropized habitats. Data collection methods include:

- **Ecological Surveys:** Seasonal inventories at the end of wet and dry season, assessing species richness, vegetation cover, and health indicators.
- **Underwater Visual Census (UVC):** Recording fish diversity, abundance, and size.
- **Advanced Tools**: Utilizing photogrammetry and metabarcoding to analyze habitat structure and species composition.
- **Transect Sampling:** Conducting linear transects for coral cover and health assessments and spatial sampling for seagrass density and composition.
- **Physiological Indicators:** Monitoring nutrient levels and isotopic ratios in key species to detect early environmental changes.

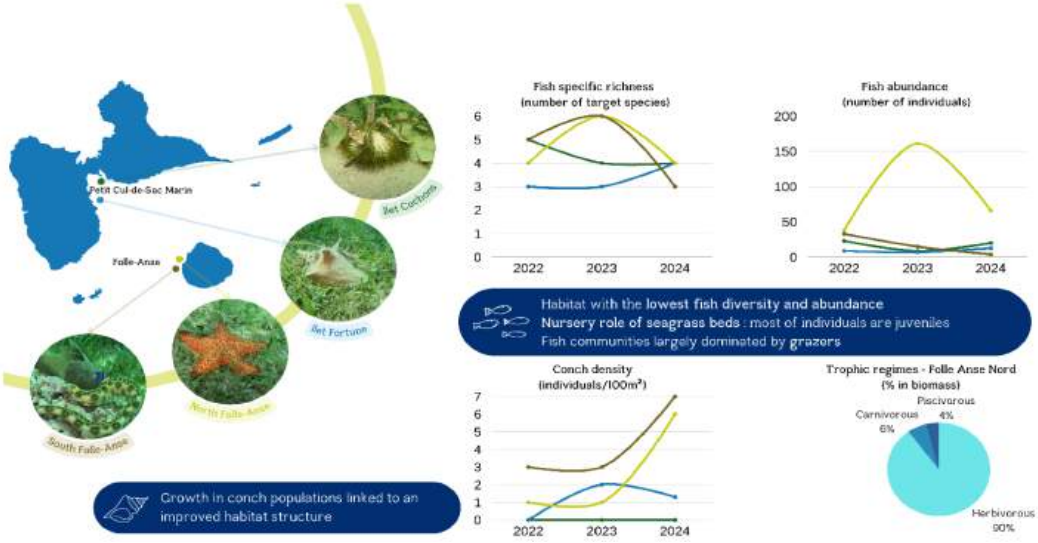

Figure 1. Growth in conch populations linked to an improved habitat stucture.

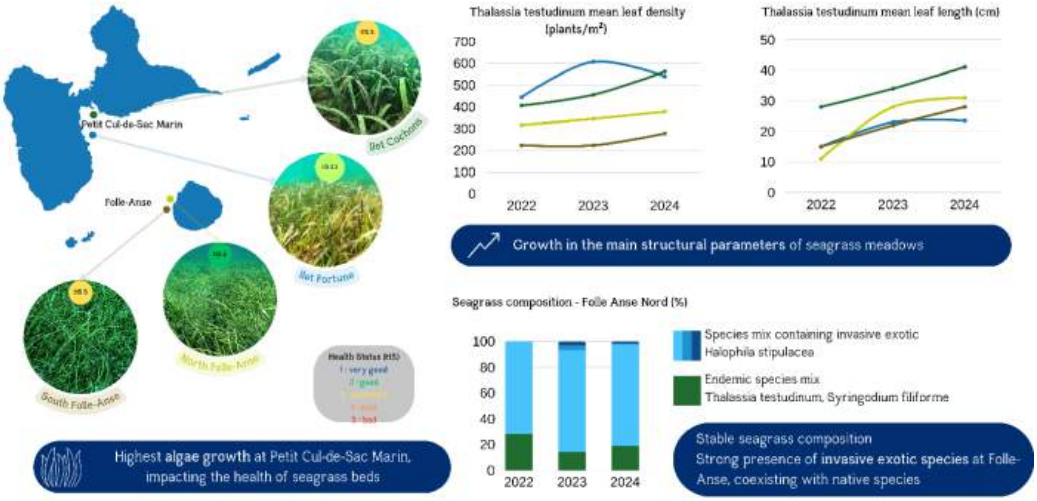

Figure 2. Highest algae growth at Petit Cult-de-Sac de Marin, impacting the health of seagrass beds.

RESULTS

The program has revealed both encouraging trends and areas requiring urgent intervention:

1. **Coral Reefs:** Despite localized improvements at sites like Mouchoir Carré, coral health is generally in decline due to Stony Coral Tissue Loss Disease (SCTLD) in 2021 and severe bleaching events in 2023. Fish communities remain stable, with all trophic levels represented, but invasive species like lionfish (Pterois volitans) pose significant threats.
2. **Seagrass Meadows:** Structural parameters, including leaf density and length, show positive trends overall. However, invasive species (Halophila stipulacea) and algal growth challenge native species, particularly in areas with compromised water quality, such as Petit Cul-de-Sac Marin.
3. **Anthropized Habitats:** Fish abundance is high, supported by artificial structures providing shelter. However, invasive species colonization, particularly lionfish, underscores the need for targeted management.

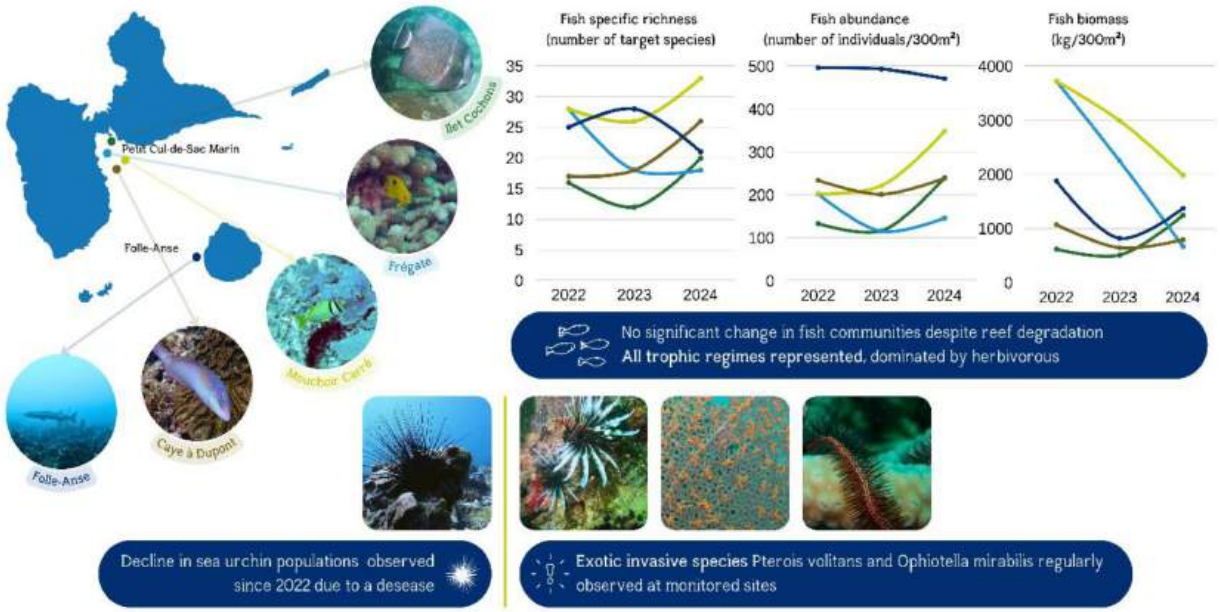

Figure 3. Decline in sea urchin populations observed since 2022 due to disease.

.

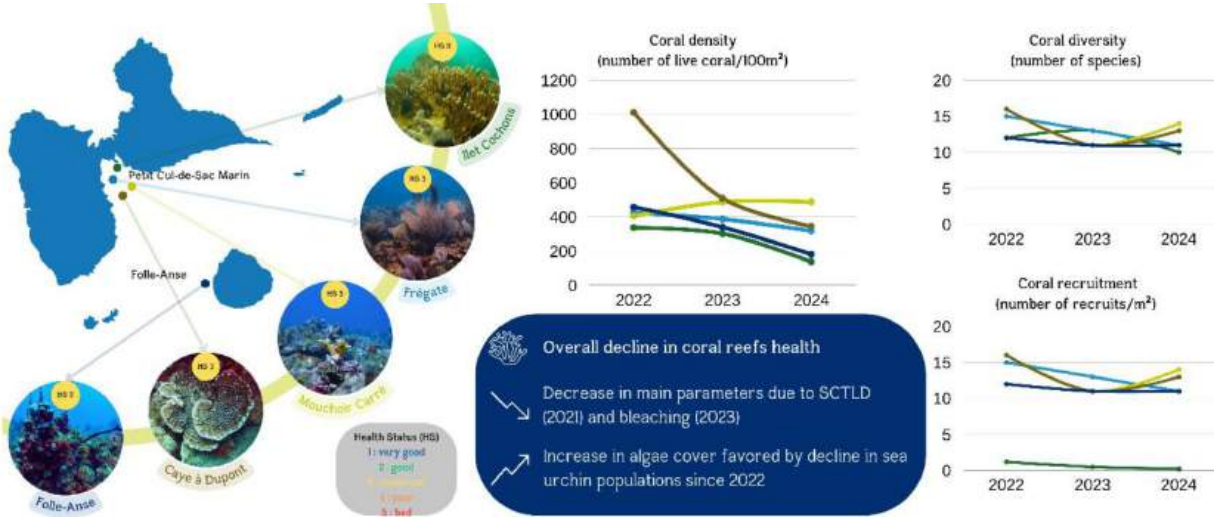

Figure 4. Overall decline in coral reef health.

DISCUSSION

The findings emphasize the interconnectedness of ecological health and human activity. While ecological moorings and restoration efforts have shown promise, the resilience of these ecosystems remains fragile under cumulative pressures. Adaptive management strategies, such as expanding no- fishing zones and enhancing waste removal, are essential.

Conclusion and Recommendations The GPA's monitoring program underscores the importance of integrated and adaptive approaches to ecosystem management. Key recommendations include:

- **Enhancing Monitoring:** Incorporate physiological and advanced spatial analysis methods for more comprehensive assessments.
- **Restoration Initiatives**: Expand coral transplantation and artificial reef projects to enhance biodiversity.
- **Community Engagement:** Promote ecotourism and awareness programs to align conservation goals with economic development.

Sustainable management is critical to preserving Guadeloupe's rich biodiversity while maintaining the socio-economic benefits derived from its port activities. As Claudine Schneider aptly stated, "A healthy ecology is the basis for a healthy economy."

KEYWORDS Environmental monitoring, coral reef, seagrass meadow, mangrove, port development.

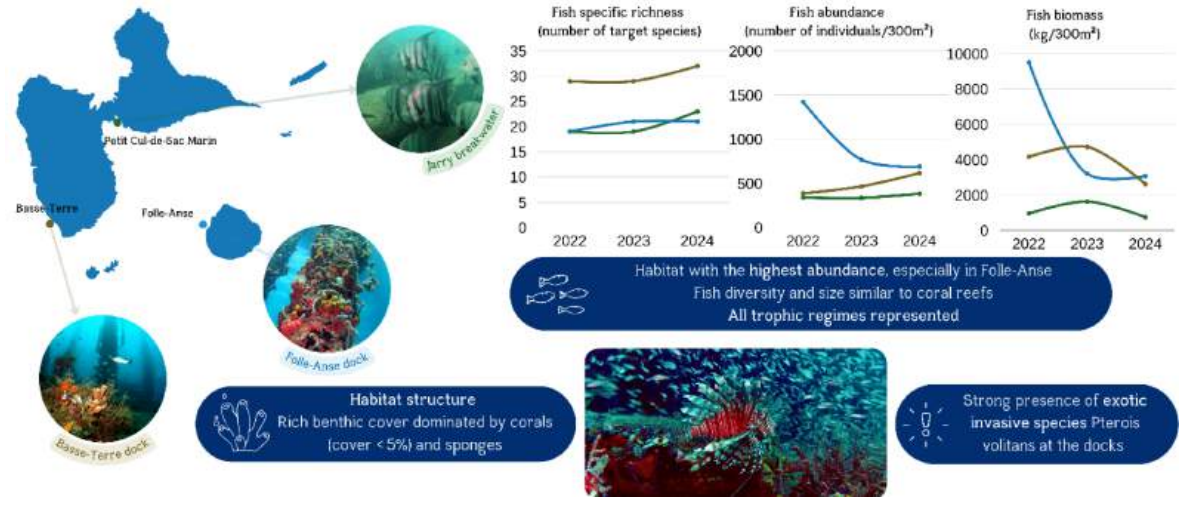

Figure 5. Habitat stucture.