

Final Evaluation Report

Your Details	
Full Name	Ricardo Jessouroun de Miranda
Project Title	Invasive sun corals on Brazilian coral reefs: monitoring, management and communication
Application ID	31796-B
Date of this Report	24 October 2022

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
<p>To monitor coral reefs, artificial shipwrecks and the ports around APACC to prevent and control the potential sun coral introduction</p>				<p>The monitoring of the coral reefs and shipwrecks was successfully done. However, the monitoring of the ports was not possible due to the bureaucracy of the port administration that made it difficult to allow the dives. Despite the occurrence of sun coral in the ports had been monitored by themselves. In Alagoas, since the project started, we have interacted with environmental agencies and public institutions warning about sun coral invasions in the region and the necessity of monitoring arrival doors as ports and shipwrecks.</p> <p>During the period of our project during collaborative network monitoring we identified the first contaminated shipwreck in Alagoas state coast (south coast in Jequiá da Praia, March 2022). This is the first report of sun coral occurrence in Alagoas coast, contributing to early detection of sun coral in the region. Immediately, we started control actions on the shipwreck removing 53 colonies around 2.5kg but it was not enough to eradicate completely on shipwreck substrate. The largest colony size of invaders was 11 cm suggesting that invasion time can be superior to three years. However, our results also showed that four monitored shipwrecks around Maceió (central) and Maragogi (north) in Alagoas state were not invaded by sun corals yet. These results show that monitoring and control activities must continue to mitigate potential invasion impacts in the region. We intend to conduct monitoring continuation around Alagoas coast in 2023/2024.</p> <p>We shifted the focus from vessels to shipwrecks due to the slow bureaucracy of accessing vessel hulls in ports. The problem of the invasion of sun coral on the Brazilian coast has been judicialized in many ports cases and access</p>

		<p>has been more restricted in many cases, making monitoring difficult. In the case of the Port of Maceió, the local environmental agency itself monitors the sun coral and informs that so far, the presence of the invader has not been registered. In the port of Suape, the presence of sun coral was detected by the local environmental agency that has monitored the site. As many shipwrecks occur around ports and reefs in the region, which could be the gateway for invaders, and are little known, we decided to change the focus to monitoring and describing the native fauna in shipwrecks, especially in Alagoas, which are very little known. Evidence that validated this successful change of focus for the project was the first record of sun coral in the Itapagé wreck, in Alagoas. We identified that both are relevant invasion vectors, ports and shipwrecks.</p> <p>Ships are intentionally sunk, supposedly to be used as fish attractor for large carnivore fish, and as a tourist attraction for divers. However, the risks of damage to the marine environment are underestimated and the supposed beneficial effect to “promote” diversity is actually an “attractor or sink” effect of species that leave the reefs going to artificial reefs. In addition, many old shipwrecks already exist and are poorly explored for tourism trade and monitored. We wrote and shared a letter to Brazilian authorities gathering these and other arguments based on published scientific evidence on invasions and fish communities on shipwrecks and natural reefs against sinkings, signed by 100 people including experts, managers, fishermen, students and civil society. The letter against the Brazilian policy to promote new free space for invasive species, which was called “Brazil policy invites marine invasive species”, was published in the Science journal (https://www.science.org/doi/10.1126/science.abb7255), as a way of drawing the world's attention to the poor management of invasions in Brazil. In addition, we wrote notes of repudiation of the sinkings promoted, without dialogue with the scientific and civil community, which even against it, was not</p>
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<p>To contribute to the creation and implementation of government policies to prevent and control sun coral introduction</p>			<p>heard.</p> <p>Although we have collaborated with the approval of the governmental polices against the invasion of the sun coral in Pernambuco, the implementation of actions still needs to be better carried out by the government. We considered it fully complete because we contributed to implementation of government policies to control sun coral invasion in Pernambuco state, when interactions with public agencies in workshops and meetings represented the start of a management agenda to design actions and activities aiming to control sun coral going on. However, actions in the same directions about sun coral management with public agencies in Alagoas state had not the same flow and speed and still need to be implemented. Despite so many meetings and formal actions taken in Alagoas with environmental and justice institutions, monitoring and control actions against sun coral by public institutions still are only in the paper.</p>
<p>To promote environmental education actions to increase social knowledge about sun corals invasion and impacts on native corals and reefs and increase people engagement to prevent and control these invaders in Pernambuco and Alagoas coast.</p>			<p>Our actions were somewhat impaired by the restrictions imposed by COVID-19; however, we were able to carry out important actions of environmental education and sharing important information, engaging people to act on the sun coral invasion problematic.</p>

2. Describe the three most important outcomes of your project.

Our project reported the first record of the sun coral occurrence in the Alagoas state, which served as a warning to environmental agencies and the local scientific and civil community for urgent actions against the invasion of this species. In addition, our project evaluated the vulnerability of Brazilian coral reefs, still free from sun coral invasion to potential functional changes caused by the imminent chance of sun coral arrival. Additionally, we also produce and share a lot of information about the invasion of the sun coral in mini-documentary video

(<https://www.instagram.com/tv/CJEzTrxFVlo/?igshid=YmMyMTA2M2Y=>), posts on social media (as example <https://www.instagram.com/p/CNtA7rxlvUw/>) and newspaper on TV (<https://globoplay.globo.com/v/10433866/>) highlighting the importance of action by the public authorities of scientific and civil society to prevent the arrival or control the expansion of the invasion in Brazil. The video was not a product predicted previously, but a collaborative partnership with journalist partners made it possible to produce important informative material on a central, relevant, and polemic theme dealt with in our project. Therefore, we decided to include it as a product of our project. We also highlighted in the shared information, how current Brazilian government policies (federal level) have “invited” sun coral invasion to Brazil, especially facilitating the sinking of intentional shipwrecks that favours the occurrence and dispersion of sun coral to natural reefs, many of them even without the presence of the sun coral. Finally, the actions of our project contributed to the elaboration and approval of important government policies (in local level) to control the expansion of the sun coral in the states of Pernambuco and Alagoas. We considered successful communication activities taking account social media metrics as follow people number (1000 before and 3,200 after Project actions), high number of likes, comments and shared posts, engagement people on posts and stories as well as repercussion and personal feedbacks sent by society inviting us to participate of forums, committees, meetings and events to discuss biological invasions in the region. During all periods of our project, we work in partnership with environmental agencies, participating in meetings, writing formal communication documents for local and federal authorities, updating invasion situations (before and after the first occurrence report in Alagoas). We voluntarily proposed a sun coral management action plan to avoid probable impacts of sun corals on native coral communities. However, the slow bureaucracy rhythm and poor commitment of public local institutions on this theme have contributed to losing the battle against invaders. Lectures occurred at universities in biology and fisheries engineering courses, and events about science, ecology and marine conservation in the states of Alagoas, Pernambuco and Bahia. We identified throughout the lectures that there is human material interested in working on the biological invasions area, but that there is no qualified staff to work on such a complex topic.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

In the first year of the project, the COVID-19 pandemic caused many limitations and difficulties in carrying out fieldwork and team integration, such as closing access to protected areas and restricting mobility of the team members. In this way, we prioritized to focus on activities of production and dissemination of knowledge about the sun coral invasion in digital media, producing a mini-documentary and a series of posts on Instagram. Additionally, bureaucracy made access to ports difficult to carry out fieldwork in these locations. One strategy to deal with this was to increase efforts to monitor shipwrecks located around these sites, which are also important vectors of entry for sun coral in the region. Finally, a period of atypical strong rains in the last year of the project also made it difficult to carry out the schedule, which had to be carried out in the last months of the project.

4. Describe the involvement of local communities and how they have benefited from the project.

Despite the restrictions imposed by the COVID-19 pandemic in the first year of the project, in the second year, there was the participation and involvement of the local community in the actions of the project, mainly collaborating with the monitoring of the occurrence and the actions of management of the sun coral in the sites of the region, actively participating also through citizen science. Local participants were instructed on how to identify and remove sun coral and how invasive species can be harmful to native species and natural ecosystems. In Alagoas and Pernambuco five local collaborators in each local and Bahia we had worked in collaborations with the NGO Pró-Mar, Itaparica.

5. Are there any plans to continue this work?

Yes, we plan to maintain sun coral monitoring activities, especially on coral reefs and shipwrecks in the region, as most of the sites are still free from invasion, which increases the chances of successful prevention and control against invasion impacts when detected early. In addition, we also intend to continue advancing in the training more people to act in monitoring and control actions against invasion expansions, promoting specific courses for divers and fishermen together with local diving operators. Additionally, we will also continue to contribute with government agencies to implement created policies to be more effective in manage sun coral invasion along the Brazilian coast. We also plan to create a continuous production of content on social media to keep active the communication with society about invasions topic. We intend to use social media to broaden the sharing of information about invasions to make more effective citizen science collaboration capabilities in identifying and monitoring and sharing information about the presence of sun coral and other invasive species.

6. How do you plan to share the results of your work with others?

We plan to publish at least 2 scientific papers in international journals. In addition, we will continue to participate in local forums and committees for discussion and decision makers about sun coral invasion (as example the CONAPACC committee <https://www.icmbio.gov.br/apacostadoscorais/conselho-consultivo.html>). We will also continue to promote lectures, classes, courses and undergraduate scientific works in the university and in partnership with environmental agencies.

7. Looking ahead, what do you feel are the important next steps?

- A continuous communication project on social media.
- Training divers to identify, communicate and remove sun coral.
- Continuous monitoring of coral reefs and shipwrecks.
- Monitoring and implementation of government policies.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes. Videos in Social media posts (<https://www.instagram.com/tv/CJEzTrxFVlo/?igshid=YmMyMTA2M2Y=>, https://www.instagram.com/p/CbsMcsbOV_y/?igshid=YmMyMTA2M2Y= and others), TV journal, lectures and academic and scientific works.

9. Provide a full list of all the members of your team and their role in the project.

Ricardo J. Miranda: Project coordinator, developed research planning of the project, collected biological data diving in marine sites, planned, executed and managed the communication actions in medias, promoted lectures, meetings, classes and supervised academic students in academic research.

Italo Lima: Collaborated for biological data collection diving in marine sites, field work logistic, financial issues and managing digital media.

Marcio Lima Junior: Collaborated for biological data collection diving in marine sites and to field work logistic.

João Feitosa: Collaborated with scientific planning of the project and supervised students in academic research.

Luisa Veras: Collected biological data diving in marine sites.

Lika Sousa: Collected biological data diving in marine sites.

Filipe Carvalho: Developed digital communication products for social media.

10. Any other comments?

Our project funded by the Rufford Foundation was very important to monitor the arrival of sun coral along Brazilian reefs and understand how they may be vulnerable to functional changes caused by the characteristics of the invader. Our project detected that although most natural reefs are still free from the presence of the invader, the occurrence of sun coral in several vectors such as shipwrecks and ports near to the reefs represents an imminent problem that needs to be continuously monitored and evaluated. It will be very important to continue the project's actions aimed at the early detection of sun coral in the reefs and the mitigation of impacts, working together with the public authorities and civil society.