

**Project title: Zoning, Conservation and Research on Brazilian Coral Reefs**

**CLP ID: 02324717**

**Brazilian reefs – APA Costa dos Corais Marine Protected area**

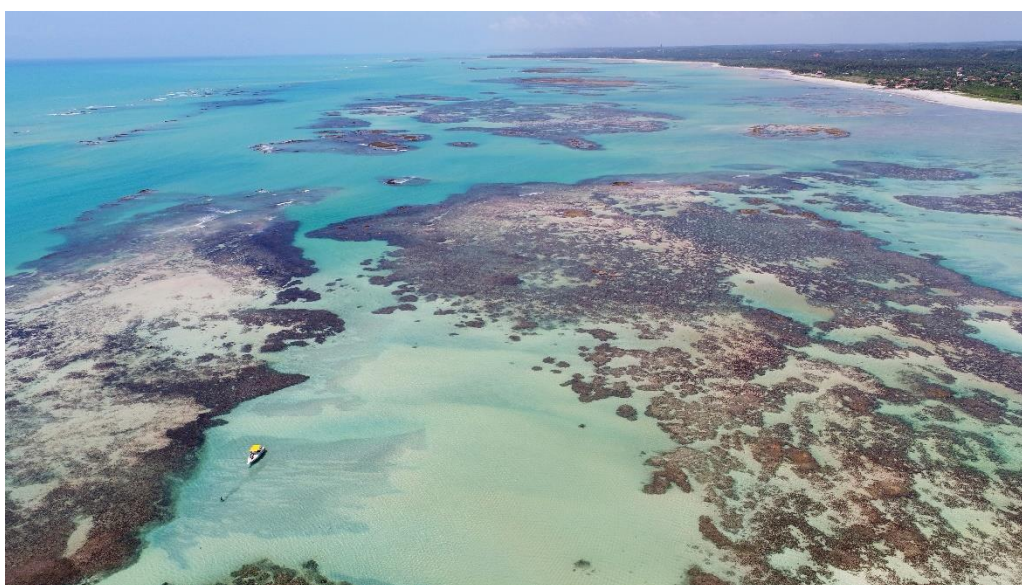
Projeto Conservação Recifal (PCR)

APA Costa dos Corais (APACC)

ICMBio

Federal University of Pernambuco (UFPE)

Federal University of Alagoas (UFAL)



This project aims to perform zoning, conservation and research actions on Brazilian reefs an area of great marine biodiversity importance.

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**Report Completed 15/04/2019**

## **Section 1:**

### **Summary**

Our project performed zoning, conservation and research actions on a threatened coral reef complex in the Northeastern Brazil an area of great importance to marine biodiversity with many IUCN CR and EN species. Together with several partners and Brazilian MPA managers our activities supported the zoning of the coral reefs area encompassing touristic areas, fishing areas and no take-zones. Additionally, many research activities were conducted in the MPA area such as mapping of deeper reefs and non-destructive underwater visual census (UVC) for reef fishes and coral communities using belt transects (20x2m). A total of 50 sites have been analyzed and more than 200 dives conducted. A large amount of environmental education materials (t-shirts, caps and species clipboards) have also been also distributed during empowerment session with local community members. In summary, our project has substantially contributed for the conservation of one of the most important coral reefs hotspot in the South Atlantic Ocean by promoting zoning, research and environmental education activities.

### **Introduction**

Coral reefs as in intense decline due to several disturbances such as climate change, overfishing, predator outbreaks and biological invasion. Local pressure such as tourism expansion and urbanization are also threatening coral reefs especially on developing countries such as Brazil. The worst environmental problems nowadays on reef ecosystems are related to increasing exploitation by tourism, lack of zoning and inspection of the coral reefs. This situation increases the challenge of reducing extinction vulnerability of IUCN species and some of IUCN CR and EN species are near local extinction and it is our most important challenge of the project area.

Zoning and use regulation on coral reefs have been shown as one of the most efficient conservation strategies to protect reef ecosystems and associated species. By starting the zoning and oversight of the reef area our project will promote a dramatic direct conservation output for Brazilian coral reefs. The zoning will directly reduce trampling on the coral reefs, misconduct activities as well as irregular use of the area. Importantly, a change in mentality of the locals and tourist will be another great achievement of the zoning.

The organization that is leading this project (Reef Conservation Project) has now a great number of partners. A full list of our local and global partners can be accessed in our webpage – <http://www.conservacaorecifa.com/eng/parceiros.php>. Specifically, some governmental and nongovernmental institutions will grant broad support during the project activities: Federal University of Pernambuco (UFPE) - Department of Oceanography (<http://www.ufpe.br/docean>) will provide assistance with students and technical-scientific assistance. APA Costa dos Corais Management team – Organization that is leading the zoning process and support field work activities. Local community is also one of our strongest links to successfully perform this project. Some fishing village leaders as well as the fishing committee members have been supporting local projects and will be extremely relevant in our activities. Additional funding and materials from this project have been supported from Rufford Foundation (RSG).



#### Localização Regional



Elaboração:  
APA Costa dos Corais/ICMBio

#### Legenda

- Zona de Uso Sustentável - ZUS
- Limites da APACC
- Zona de Praia - ZP
- Zona de Conservação - ZC
- Zona Exclusiva de Pesca - ZEP
- Zona de Visitação - ZV
- Zona de Preservação da Vida Marinha - ZPVM
- Zona de Transição - ZT

### Project members

Pedro Pereira – Project Coordenador and NGO Director. Active in all project aspects such as administrative tasks, field work, empowerment sections and reporting/publications writing.

Gislaine Lima – Field work and local NGO coordinator. Responsible for all the field work logistic and data collection during dives.

Antonio Vitor – Staff from our NGO. Responsible for administrative tasks, social media and data analyses.

Walter Dennis – Diver, responsible for our maps and modelling activities. Also, responsible for data analyses for project execution.

Claudio Henrique – Diver and responsible for data collection during field work.

Lucas Noronha – Our NGO intern. Support with all general project activities and administrative tasks.

## **Section 2:**

### **Aim and objectives**

The main objectives of the project were (1) Zoning implementation and oversight of a reef area, (2) Display monthly underwater visual census analyzing fish and corals communities aiming for a long term monitoring (3) Empower community members to act as field agents conducting surveillance in the reef; (4) Oversee and monitor the area to avoid impacts caused by tourism and (5) Disseminate environmental education material for conservation project.

### **Changes to original project plan (max 200 words)**

Our project had only small changes compared from the original plan. Most of the aims have been achieved and plans were maintained from the proposal. Only aims related to the oversee and monitoring the area have been slightly changed once we had to have special permits and labor contract in order to allow someone to oversee the reef area included in the MPA. On the other hand, we could increase our environmental awareness activities and support events related to marine conservation on the MPA such as clean up days, activities on schools and larger integration with local community members.

### **Methodology (max 500 words)**

Underwater surveys (biodiversity data) were the first tool to create the zoning maps; however, information from the local community were also considered. Non-destructive underwater visual census (UVC), for reef fishes and coral using transects (20x2m) will be performed monthly during the entire project on different sites. Sites with different number of tourists have been analysed for comparison of the impacts caused by visitors, as well as artificial fish feeding. In addition, water temperature and coral bleaching processes in different sites of the reef complex will also be analysed using the Coral Health Monitoring Chart and Reef Check Protocols. Non-destructive underwater visual census (UVC) was first used by Brock (1954) and is currently the most important method studying population and community censuses of tropical fishes (Kulbicki et al., 2007). This technique has the advantage of being non-destructive, relatively inexpensive to perform and data are immediately available (Stobart et al., 2007).

The field agents composed by the local community individuals were trained by project members during empowerment sessions (2 weeks long). Classes were conducted for approximately two week and more than 30 field agents will be fully trained during the entire project. The training will consist of basic information about the reef ecosystem, description, characteristics and behavior of key marine species and especially on methods and techniques of conscious conduct on coral reefs for fishermen, tourists, students and the all the types of visitors.

Environmental education events such as lectures held fortnightly in the fishermen colonies, squares, and also in the city center will be conducted. Educational materials (caps, shirts and brochures) will be made addressing the preservation of the reef area and distributed to the community and tourists during these events.



(around 30 m of depth). These deeper reefs seem to be working as a refuge for fish and coral populations and we are now testing the deep refuge hypothesis using Brazilian reefs as a model. Our project has produced a video highlighting the importance of these reefs with CLP support (<https://www.youtube.com/watch?v=iOlw91p48eo&t=1s>) and have a published manuscript titled: "Effects of depth on reef fish communities: insights of a "deep refuge hypothesis" from Brazilian reefs" the first one in Brazilian waters so far discussion this topic. Link - <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0203072>.

Moreover, we have now conducted the first detailed database on reef biodiversity of the MPA. A total of around 50 sites have been analyzed and more than 200 dives conducted performing a massive biodiversity database mostly for fish and coral communities. See data below:

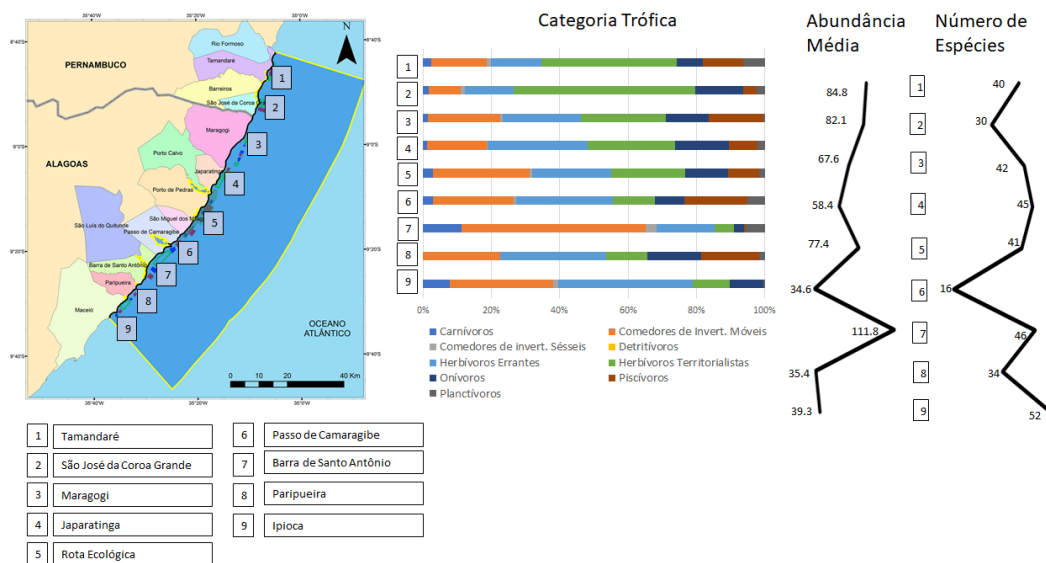


Fig 2 – Database of fish community for the MPA with data clustered on trophic guilds.

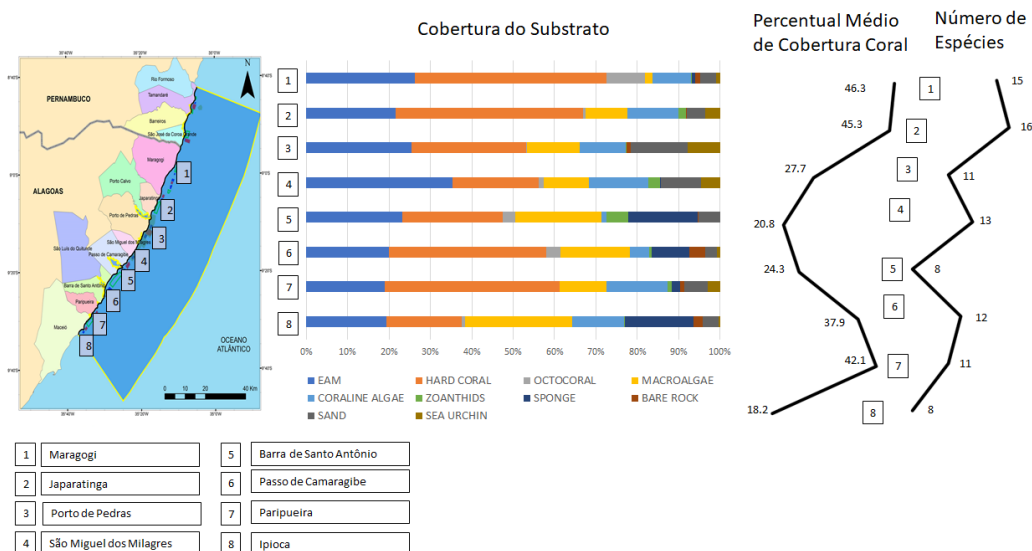


Fig 3 – Database of coral community for the MPA with data clustered on benthic categories.

### (3) Empower community members

A total of 5 empowerment sessions have been conducted with local community members around the MPA with more than 400 locals involved during these activities. The topic included

in the empowerment section were related to the importance of coral reefs conservation, how to improve tourism quality and also ideas of suitable fishing for the next generations. Additionally, led by another local NGO (Instituto Yande) our project has supported and collaborated with a series of courses for local community members on similar conservation topic inside the MPA and mostly focused on the zoning process and how zoning would benefit both biological, social and economic aspects of the area. These courses have been conducted all around the MPA in 6 municipality and included more than 500 locals from different age and engaged on different activities such as fishing and tourism.



Fig 4 – Course with local community members performed in the MPA.

Finally, we also included a workshop during our activities with local community regarding the risk of lionfish invasion in our coral reefs. Lionfish is an invasive species that has dramatically impact reefs on the Caribbean and is a real threat on Brazilian coast therefore it has extremely import to include these activities during our project. More than 200 school kids and local fisherman joined these workshops that have been performed on 5 municipalities around the MPA.



Fig 5 – Workshops during our activities with local community regarding the risk of lionfish invasion in our coral reefs.

**(4) Disseminate environmental education material for conservation project.**

During our project execution a large amount of environmental education material have been distributed and used in our activities inside the MPA. At least 1 thousand banners, folders, stamps and media files have been broadly distributed during our project activities. Specifically, for environmental education activities and conservation proposes a species identification PVC slates (for fish and coral communities) have also been created with CLP logo and distributed for local community members and kids. A total of 200 PVC slates have been created and distributed during our project. For our team and local partners fishermen's we have also created a UV t-shirt with protect from the sun to be used during field work.



Fig 6 – UV t-shirt to be used during field work with CLP logo and other partners

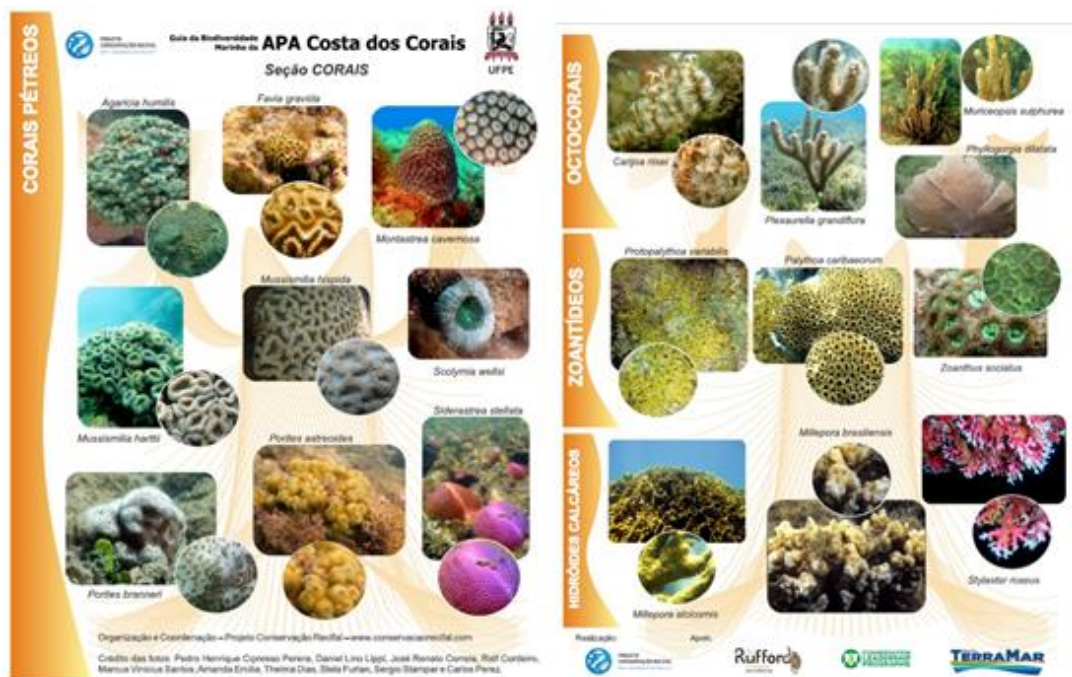


Fig 7 – Species Identification PVC slates (coral) created during our project with CLP logo.



## **Communication & Application of results**

Our social media is updated weekly (<http://www.facebook.com/projetoconservacaorecifal>) with all the information and new facts from the project. Moreover, the project website (also periodically updated) has just been released with a huge amount of information on coral reefs in general ([www.conservacaorecifal.com](http://www.conservacaorecifal.com)). Furthermore, the material called "Conscious conduct on reef ecosystems" created by the Brazilian government is being used in an approach to tourist will be available in full on the project site including downloadable expanding the disclosure of the material. In preparation is manuscript are also been prepared. Species Identification PVC slates have also been created with CLP logo.

## **Monitoring and Evaluation (max 200 words)**

Our team has performed meeting every week in order to monitor the project activities and plan any other different action or change from the original project. Since the beginning of the project, after the CLP leadership course our team has been really connected one with each other and that is probably the most important reason of the project success. We also tend to produce monthly reports from our CLP project and other projects currently performed by our NGO. Each member of the project is responsible for a specific area of the project such as field data, local community workshops and therefore they produce a brief distribution of the activities performed every month and that could allow everyone to be on track of the activities performed and the ones that are about to come.

## **Achievements and Impacts (Max 500 words)**

While the zoning is the most challenging issue of the project it is also the most rewarding activity from our initiative. This project will allow not only ecological benefits for the reef area but also social outputs for all the local stakeholders. Reef zoning is one of the most effective conservation measures on reef ecosystems already proving efficiency in Australia and many Pacific Islands. As previously mentioned, zoning implementation encompasses visiting areas (only for tourism), fishing areas (only for registered local fishermen) and no-take areas. Therefore, all the collected info such as coral/fish diversity and abundance, reef complexity, preferred touristic areas, preferred fishing areas, etc. allowed us to select the sites for each activity together with local stakeholders consulting. In this context, the production of zoning maps is one of the most important achievements of our project that together with local managers has produced the zoning maps.

A large increase on ecological data around the MPA was also probably one of the most important achievements of our CLP project. As previously mentioned, we had acquired the largest database on fish and coral community that would be part of a long term monitoring process in order to better understand the effects of zoning on reef restoration. More than 200 transects have been performed around the whole MPA and these data will be compared in terms of space and time to keep tracking on biodiversity data on Brazilian reefs.

Finally, during our environmental education activities and materials dissemination we had the opportunity to make strong connection with fishermen and with local kids around the MPA. During our training courses we had change to motivate kids to be part of the conservation actions in the area and we are sure that in the next projects and future activities we will count with a much stronger support from local communities. More than 100 kids were included in our activities and in our perspective that was one of the most important achievements of our project with high impact on local conservation.

### **Capacity Development and Leadership capabilities (Max 250 words)**

CLP project provided a dramatic improvement on the development and leadership of the project and members therefore our NGO team. Pedro Pereira our project coordinator has acquired great leadership skills mainly focused on Behavior Change Communication and how to be closer to the team and deal with every day problems. Our team members Gislaine Lima and Antonio Victor gained large experience on diving activities and data collection on coral reefs. During the project they had the opportunity to dive on several places and specialised their skills on field work and scientific ecological data. In general, all the project members gained large experience on dealing with local community member and for the conservation approach performed with the zoning we also guarantee a strong ability to deal with management situations. Finally, reports and periodical meetings also grantee a learning process on project management and planning that would be now constantly applied for all team in many other future projects.

### **Section 3:**

#### **Conclusion (max 250 words)**

Our project has provided substantial improvement for the conservation of Brazilian coral reefs, specifically for the MPA Costa dos Corais the largest MPA with coral reefs on Brazilian reef. Our zoning maps will contribute for ecological conservation of the area by proposing “no-take” zones and support fishing recovery by allow exclusive fishing areas. By regulate tourism for some areas and restricting disorientated tourism activities the project will also guarantee reef integrity in a long-term scale. The database produce by our underwater field work will be a real initial database for the MPA management and will generate a long-term monitoring process. Lastly, we will guarantee a stronger engagement of local community members and kids by our empowerment sessions and environmental material dissemination.

#### **Problems encountered and lessons learnt (max 500 words)**

- *Which project activities and outcomes went well and why?*

The zoning process went well, and we have now a strong support of local community members for the zoning. We strongly believe that the reason the zoning was a success was the participative way we build with the locals by promote the dialogue and by allowing them to be part of the decisions (selection of the areas).

- *Which project activities and outcomes have been problematic and in what way, and how has this been overcome?*

We had problems related to the oversee and monitoring the area aims and that have been slightly changed once we had to have special permits and labor contract in order to allow someone to oversee the reef area included in the MPA. On the other hand, we could increase our environmental awareness activities and support events related to marine conservation on the MPA such as clean up days, activities on schools and larger integration with local community members.

- *Briefly assess the specific project methodologies and conservation tools used.*

For the zoning process with have used a combination of biological data acquired during field work together with use information from local community members (fishermen's and tourism operators) that has allowed the maps preparation in order to increase conservation efficiency and reduce conflicts. We have also use Non-destructive underwater visual census

(UVC), for reef fishes and coral using transects (20x2m) that were performed monthly during the entire project on different sites.

- *Please state important lessons which have been learnt through the course of the project and provide recommendations for future enhancement or modification to the project activities and outcomes.*

Always include local community members on the decision makers

Strong organizing and planning for deeper dives (below 30 m)

Periodical meeting with the team and monthly reports in order to keep track on the project

Connections and engagement of local kids on the conservation activities really fruitful

### **In the future**

Zoning has been officially proposed by MPA managers with our project support and now it is in Brazilian government for final validation. After zoning implantation efforts must be conducted on surveillance of the areas as well as monitoring of *no take* areas to better understand reef recovery and zoning influence on reef biodiversity. An initial database was established on different zones inside the MPA and now it is vital to monitor environmental responses after zoning in a long-term process. We plan to apply for future CLP grant and also for other grant sources such as a Completion grant from Rufford Foundation by the end of this year in order to support our NGO activities focused on surveillance of the zoned areas and also ecological monitoring.

# Financial Report

Date	Phase	Budget line	Receipt Number	Description	Unit cost (local currency)	Quantity	Total price (local currency)	Exchange Rate	Total USD (\$)	Reason for Purchase
02/06/2018	A-Phase 1 Project preparation	Communications (telephone/internet/postage)	12345	Internet cost	82.5	10	825.275	300.00	Internet for our research team	
12/01/2018	A-Phase 1 Project preparation	Field guide books, maps, journal articles and other printed material	12346	Maps for zoning planning	100	1	275.275	100.00	Maps for initial planning of zoning	
21/01/2018	A-Phase 1 Project preparation	Team training	12358	Fuel, food and printing material for team	700	1	1925.275	700.00	Sessions for empower our team members	
10/03/2018	B-Equipment	Scientific field equipment and supplies	12685	GPS	962	1	962.275	350.00	Tracking dive sites	
14/03/2018	B-Equipment	Scientific field equipment and supplies	12594	Drone	2200	1	2200.275	800.00	Aerial images of coral reefs for maps	
19/03/2018	B-Equipment	Photographic equipment	12679	GoPro's	687	2	1375.275	500.00	Record fish and coral diversity	
21/03/2018	B-Equipment	Boat/engine/truck (including car hire)	12789	Boat and car hire	220	12	2640.275	960.00	Access field sites	
09/05/2018	C-Phase 2 Project implementation	Accommodation for team members and local guides	12742	Accommodation during field trips	100	30	3025.275	1100.00	Accommodation during field trips	
09/05/2018	C-Phase 2 Project implementation	Food for team members and local guides	12800	Food during trips and workshops	26	100	2612.275	950.00	Food during trips and workshops	
09/05/2018	C-Phase 2 Project implementation	Travel and local transportation (including fuel)	12911	Car hire, fuel and insurance	240.6	20	4812.275	1750.00	Travel for field sites	
04/06/2018	C-Phase 2 Project implementation	Workshops	12642	Workshop materials, food and accommodation	1512.5	1	1512.275	550.00	Better prepare our team members	
04/06/2018	C-Phase 2 Project implementation	Education activities and materials (brochures, posters, etc.)	12488	T-shirts	29	100	2800.275	1018.00	Disseminate our project on local communities	
04/06/2018	C-Phase 2 Project implementation	Education activities and materials (brochures, posters, etc.)	12488	Folders	2	1000	2000.275	727.00	Disseminate our project on local communities	
04/06/2018	C-Phase 2 Project implementation	Education activities and materials (brochures, posters, etc.)	12488	Capes	15	100	1500.275	545.00	Disseminate our project on local communities	
28/10/2018	D-Phase 3 Post Fieldwork Expenses-Administration	Other (Phase 1)	12390	Printing and office materials	275	1	275.275	100.00	Admin coast	
05/11/2018	D-Phase 3 Post Fieldwork Expenses-Administration	Other (Phase 1)	12954	Results dissemination by mail and social media	275	1	275.275	100.00	Disseminate our project results	
22/10/2018	B-Equipment	Other (Equipment)	12678	Buoys, ropes and signs	160.8	30	5362.275	1950.00	Equipment for zoning delimitation and signing	

Itemized expenses	Total CLP Requested (USD) *	Total CLP Spent (USD)	% Difference	Details & Justification	Proposed Spending (Preliminary Report Only)
<b>PHASE I - PROJECT PREPARATION</b>					
Communications (telephone/internet/postage)	250.00	300.00	20%		
Field guide books, maps, journal articles and other printed materials	50.00	100.00	100%	Maps were more expensive than previously planned	
Insurance					
Visas and permits					
Team training	800.00	700.00	-13%		
Reconnaissance					
Other (Phase 1)					
<b>EQUIPMENT</b>					
Scientific field equipment and supplies	1,150.00	1,150.00	0%		
Photographic equipment	500.00	500.00	0%		
Camping equipment					
Boat/engine/truck (including car hire)	980.00	960.00	-2%		
Other (Equipment)	1,950.00	1,950.00	0%		
<b>PHASE II - IMPLEMENTATION</b>					
Accommodation for team members and local guides	1,250.00	1,100.00	-12%		
Food for team members and local guides	850.00	950.00	12%		
Travel and local transportation (including fuel)	1,750.00	1,750.00	0%		
Customs and/or port duties					
Workshops	550	550.00	0%		
Outreach/Education activities and materials (brochures, posters, video, t-shirts, etc.)	2,150.00	2,290.00	7%		
Other (Phase 2)					
<b>PHASE III - POST-PROJECT EXPENSES</b>					
Administration	120.00	100.00	-17%		
Report production and results dissemination	150.00	100.00	-33%	Brazilian government supports dissemination	
Other (Phase 3)					
<b>Total</b>	<b>12,500.00</b>	<b>12,500.00</b>			

\*These figures should be the same as those listed in the original proposal

## Section 4:

### Appendices

Output	Number	Additional Information
Number of CLP Partner Staff involved in mentoring the Project	2	
Number of species assessments contributed to (E.g. IUCN assessments)	0	In progress
Number of site assessments contributed to (E.g. IBA assessments)	1	
Number of NGOs established	1	
Amount of extra funding leveraged (\$)	-	Aprox. 10K
Number of species discovered/rediscovered	2	
Number of sites designated as important for biodiversity (e.g. IBA/Ramsar designation)		
Number of species/sites legally protected for biodiversity		
Number of stakeholders actively engaged in species/site conservation management		
Number of species/site management plans/strategies developed		
Number of stakeholders reached		
Examples of stakeholder behaviour change brought about by the project.		
Examples of policy change brought about by the project		
Number of jobs created	3	
Number of academic papers published	1	
Number of conferences where project results have been presented	1	

Appendix 4.1 CLP M&E measures

### Our YouTube Channel –

[https://www.youtube.com/channel/UChRUNc6SAM7ZIPedGFX2SDw/videos?view\\_as=subscriber](https://www.youtube.com/channel/UChRUNc6SAM7ZIPedGFX2SDw/videos?view_as=subscriber)

## Paper published during the project:

The screenshot shows the PLOS ONE article interface. At the top, the PLOS ONE logo is on the left, and navigation links for PUBLISH, ABOUT, and BROWSE are in the center. A search bar is on the right. Below the header, the article is identified as a RESEARCH ARTICLE, with OPEN ACCESS and PEER-REVIEWED badges. The title is "Effects of depth on reef fish communities: Insights of a 'deep refuge hypothesis' from Southwestern Atlantic reefs". The authors listed are Pedro Henrique Cipresso Pereira, Cláudio Henrique Macedo, José de Anchieta C. C. Nunes, Laura Fernandes de Barros Marangoni, and Adalto Bianchini. The publication date is September 26, 2018, with a DOI link. On the right side, there are statistics: 0 Save, 0 Citation, 1,775 View, and 1 Share. Below these are buttons for Download PDF, Print, and Share. A 'Check for updates' button is also present. Underneath, there is an 'ADVERTISEMENT' section and 'Subject Areas' including Coral reefs, Fish physiology, and Herbivory. At the bottom left, there is a table of contents with 'Abstract' selected.

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### Effects of depth on reef fish communities: Insights of a "deep refuge hypothesis" from Southwestern Atlantic reefs

Pedro Henrique Cipresso Pereira, Cláudio Henrique Macedo, José de Anchieta C. C. Nunes, Laura Fernandes de Barros Marangoni, Adalto Bianchini

Published: September 26, 2018 • <https://doi.org/10.1371/journal.pone.0203072>

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**Abstract**

**Introduction**

Deeper reefs are often considered to be less susceptible to local and global disturbances, such as overfishing, pollution and climate change, compared to shallow reefs and therefore could act as refugia for shallow water species. Hence, the interest on deeper reefs has happened at a time when shallow reefs are undergoing unprecedented changes. Here we investigated the hypothesis that fish community differed from shallow to deeper reefs due to factors apart from habitat structure and quality and therefore discuss for the first-time insights of a "deep refuge hypothesis" from Brazilian reefs. We collected data on fish community, benthic community and physiological conditions of two coral species on shallow (< 6 m) and deep reefs (> 25 m). No significant difference on substratum composition was observed comparing sites and depths. Additionally, physiological data on corals also showed similar oxidative status and growth conditions when comparing the two-coral species in shallow and deep reefs. Conversely, our

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0203072>

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