



339/2A, Coima Vaddo, Quitula, Aldona, Bardez, Goa – 403508. | Tel : 9822182402
E-Mail : info@coastalimpact.in | Website : www.coastalimpact.in

CERTIFICATE OF INTERNSHIP

This internship program certificate is presented to

Dhrishit Khandar

for successfully completing an internship program from

26th May 2025 to 31st May 2025

During this internship period, he gained an understanding of Fish identification, iNaturalist, and Coral health using CPCe.



Venkatesh Charloo

Venkatesh Charloo
Founder Trustee

Issued on 09.07.25



ACKNOWLEDGEMENTS

I am greatly indebted to Mr Venkatesh Charlu (Founder) of Coastal Impact, Goa, for granting me this opportunity to intern at their organisation.

I would also like to express my deepest gratitude to Mr Jeremy Josh (Chief Marine Biologist), who helped me gain hands-on skills and deep knowledge of data analysis, restoration ecology, and coral reef monitoring from the internship. It also deepened my interest in this field of marine sciences and gave me a better understanding of what a future career in such an organisation may look like. Lastly, I would like to thank the entire team of Coastal Impact, Goa, India, for being supportive during my internship and guiding me whenever required.

Internship Report

Summary

• Brief overview of the internship experience

My internship at Coastal Impact was a fruitful and insightful experience. Mr Jeremy Josh, a marine biologist by profession and the technical and scientific officer, supervised me during the internship. Under his guidance, I learnt how to analyse benthic data based on:

- Coral species and their diseased counterparts
- Sediment, rock, and other debris
- Algae
- Sponge

Through the tasks that I was assigned during the internship, I got a glimpse of the administrative functioning of the Coastal Impact, India office. Additionally, the overall mission of the organisation and its way of achieving it were explained to me by Mr Jeremy. I also had the opportunity to analyse previously collected data by the diving team, and this enriched my knowledge on the biodiversity and composition of the testing sites commonly visited by the Coastal Impact, India team.

• Key learnings

I gained several skills through the internship course, including:

- Identified and documented fish and marine biodiversity on iNaturalist
- Analysed coral microfragmentation growth data through AI platforms
- Worked with micro-fragmentation data, initially in raw table formats, thereby contributing to restoration monitoring efforts
- Analysed sediments from three coastal sites - Lobster Avenue, On the Rocks, and Jetty to identify anthropogenic and natural deposition patterns
- Analysed quadrat and transect-based surveys to assess benthic composition using Coral Point Count with Excel extensions (CPCe), thereby contributing to long-term reef monitoring

• Main outcomes

I gained hands-on skills and deep knowledge of data analysis, restoration ecology, and coral reef monitoring from the internship. Learning about micro-fragmentation procedures and handling data related to coral pieces, particularly on artificial reef tiles, were important components of my work. In addition to evaluating recruitment data by looking at empty tiles to identify trends in larval settling and site suitability, I worked with raw data tables to track coral development and survival. The sediment study helped me compare grain size, deposition rates, and human effects at three different locations. The investigation of benthic composition using quadrats and transects

taught me to classify benthic materials according to functional groups. Abiotic substrates such as rock or dead coral, algae, sponges, rubble, sediment, and live coral (including damaged or bleached colonies) were among the classifications that I did on CPCe. Based on this classification, I was able to evaluate substrate quality and habitat complexity, which is crucial for reef resilience and coral recruitment. Benthic data plays a pivotal role in the evaluation of the current condition of the reef and decisions regarding restoration choices, such as location identification for planting artificial structures or prioritisation of micro-fragmentation activities. Due to the skills and knowledge gained at the internship, I was able to relate field data with practical conservation results.

Introduction

- **Background on Coastal Impact India and its mission**

Coastal Impact, founded in 2009 by Mr Venkatesh Charloo in Goa, India, is a non-profit organisation dedicated to marine conservation. Over the years, they have conducted numerous projects to protect aquatic life and habitats along the Indian coastline. Through methods of advocacy, including outreach, research, and conservation, the organisation aims to create a sustainable marine ecosystem where pelagic life thrives. They hope to empower local communities to protect their coastal environments so that their goal is adopted by the general public as well. Further, they have continued to support PhD and postgraduate students involved in the marine field through volunteer programmes, internships, and on-site experiences. As of now, they have reached out to over 3000 students, adopted 142 coral fragments, and fragmented over 500 coral pieces.

- **Internship objectives and expectations**

In order to have practical experience in marine conservation, especially in the area of coral reef protection, I enrolled in this internship. I decided to put my writing into practice after completing a review article titled "Reef resilience: navigating the interplay of genetics, microbiomes, and environmental challenges."

Learning to use programs like CPCe and iNaturalist, taught me about identifying fish and coral species, assessing the health of corals, and analysing reef data.

Additionally, I wanted to improve my ability to research benthic life using tools like transects and quadrats. Understanding how various elements (such as algae, silt, and healthy substrate) impact coral development and reef regeneration, as well as how this type of data aids in the planning of actual conservation efforts, was my objective.

- **Duration and scope of the internship**

I interned for a week at Coastal Impact. The internship focused on coral reef conservation, ecological monitoring, and data analysis.

My work covered a wide range of field and desktop tasks, including fish and coral identification and coral health assessment.

I assisted in sediment sampling and analysis across multiple sites and worked with coral micro-fragmentation and artificial reef recruitment data. I also took part in benthic composition surveys using quadrat and transect methods, and analysed benthic data to assess the presence of live coral, algae, sediment, and other substrates.

As part of the internship, I had the opportunity to visit the National Institute of Oceanography (NIO), where I gained insight into how marine research operates in India, including processes around permits, institutional collaboration, and funding. At NIO, I was introduced to research on coral genetics and resilience, including how environmental stressors affect coral health, simulations on live coral, and the role of genetics in shaping coral response to changing conditions. This internship gave me both practical experience and exposure to the systems that support marine science and conservation in India.

Organisation Overview

Coastal Impact India's work, projects, and impact areas:

Coastal Impact's work is guided by a deep passion for marine conservation and a commitment to preserving India's rich marine biodiversity. Backed by a team of skilled scientists, expert divers, and marine conservationists, Coastal Impact combines passion with technical expertise. The team's knowledge in coral restoration, artificial reef creation, and marine biodiversity surveys ensures that their conservation efforts are both scientifically sound and impactful.

Since awareness plays a large role in the protection of marine life, Coastal Impact holds annual training sessions for students and scientists about coral reefs and their vital role in the ecosystem. Through this approach, they aim to communicate their thoughts to locals as well, so that they can make more well-informed decisions which help foster a sustainable future. Their research and findings also help other scientists in the field to validate or improve their theories, spur further investigation, and provide new information.

- **Organisational structure and key personnel** Coastal Impact was founded by Mr Venkat Charloo, a passionate marine conservationist, to build awareness about the marine ecosystem to save Goa's precious marine life. I was supervised by Mr Jeremy Josh, who is the chief marine biologist at Coastal Impact. Mr Josh constantly looks for new specimens or new fish species where there were none recorded before. Furthermore, I also interacted with professionals and other interns at the National Institute of Oceanography, learning about their day-to-day routines, current projects, and challenges they're addressing.
- **Current initiatives and challenges they're addressing**

Coastal Impact Goa is actively engaged in coral reef restoration, but like many conservation efforts, it faces both logistical and ecological challenges. One key issue is the use of traditional coral tables for micro-fragmentation and growth. Though it is useful for controlled growth, these tables are often unstable, making them collapse due to strong currents, storms, or substrate failure.

To overcome these limitations, the organisation has been shifting towards the use of artificial reefs (ARs). Artificial reefs offer several advantages; they are more stable, mimic natural reef structure, and promote symbiotic interactions with reef fauna. It helps researchers understand how coral larvae settle and grow in semi-natural conditions. This allows for more effective monitoring of restoration success and long-term reef resilience.

By adapting its methods and infrastructure, Coastal Impact is actively working to refine its restoration techniques and improve coral survival outcomes. They contribute valuable data on the ecological performance of AR-based restoration in Indian waters.

Daily Activities and Experiences

Day1

Analysis of data-4 sets of data:

1. Micro-fragmentation data via tables (initially) and artificial reefs
2. Coral recruitment data on AR empty tiles
3. Sediment analysis at 3 sites
4. Quadrat and transect analysis for benthic composition

Day 2:

- Use of AI/manual pixel counting to calculate the area of coral fragments over months
- Potential/in-work analysis of Goniopora corals or slow-growing corals by counting white spots (each polyp) using AI [normal method of masking corals isn't that successful or reliable]

Day 3:

On day 3, I visited the NIO (National Institute of Oceanography). I understood how marine science works in India [including factors like permits, funding, letters, etc].

I learnt of the main topics researched by employees at the NIO:

- How do environmental stressors impact corals based on their genetic factors?
- Resilience of coral when subjected to different conditions
- Simulations on live coral

Day 4:

I learnt about the issues with using tables and the advantages of using artificial reefs:

- Tables are more susceptible to collapse
- ARs better simulate symbiosis and natural reef interactions

- ARs allow for recruitment analysis
- Fragments may go missing

Day 5:

I continued with iNaturalist logs. Through this practice, I got a better idea of the pelagic biodiversity surrounding Grande Island. I also found some existing research papers on the corals of Grande Island:

1. <https://www.sciencedirect.com/science/article/abs/pii/S0141113624000886>
2. https://www.researchgate.net/profile/Sreekanth-Gb/publication/286688295_FISH_ASSEMBLAGES_OF_GRANDE_ISLAND_SITUATED_ALONG_SOUTHWEST_COAST_OF_INDIA

Day 6:

I learnt how to analyse benthic data based on:

- Coral species and their diseased counterparts
- Sediment, rock, and other debris
- Algae
- Sponge

This analysis helps to estimate the availability of reliable substrates for coral to affix to, in turn determining the likelihood of the corals to thrive and grow at each site. Benthic data also helps scientists gain crucial insights into the levels of sediment, space availability, and the presence of other benthic organisms (e.g., sponges and algae) that facilitate survival success for the coral fragments. Changes in benthic data are also good indicators of coral growth response.

Other learnings (like the use of mesh coverings on ARs, use of concrete tables, etc) were included in the annual report.

Day 7:

I researched articles specific to *Turbinaria* research, and the following are some queries that I listed from my literature research:

Coastal Impact *Turbinaria* specific research (questions)

1. Experimental assessment of the feeding effort of three scleractinian coral species during thermal stress: Effect on the rates of photosynthesis.
 - Why does feeding help maintain photosynthesis and the stability of corals?
 - What's a possible reason *Stylophora pistillata* reduced feeding at higher temperatures?
2. Effects of elevated water temperature, reduced salinity, and nutrient enrichment on the metabolism of the coral *Turbinaria mesenterina*:
 - Why did the corals not have a significant effect when they were exposed to only low salinity and high nitrates, but no heat?
 - What's the reason for heat + low salinity to just drop survival to half rather than a more detrimental effect?

3. The Effects of Temperature, Light, and Feeding on the Physiology of *Pocillopora damicornis*, *Stylophora pistillata*, and *Turbinaria reniformis* Corals:
 - Why did some species like *Turbinaria reniformis* maintain their lipid reserves with low light, even though light plays a role in the photosynthesis carried out by zooxanthellae in corals?
4. High-sediment tolerance in the reef coral *Turbinaria mesenterina* from the inner Great Barrier Reef lagoon (Australia)
 - How accurate is it using a mesocosm to simulate turbidity, and can it be considered representative of real-life conditions?
 - Why are species like *Turbinaria mesenterina* more resistant to sediment buildup/Why can they use sediment buildup to their advantage as compared to other species?

Skills Development and Learning Outcomes

- Technical skills gained (environmental assessment, data analysis tools, community engagement) -

Through the internship, I understood how to operate software programs such as CPCe and iNaturalist. I got an idea of what the commands, settings, and features of the programs look like, and what role they play in data analysis and logging. At the NIO, I was also able to converse with several experts in the field who specialise in topics other than coral, giving me a broader understanding of marine science. Lastly, I also witnessed an intern at the NIO discuss his plan for an investigation with my instructor, allowing me to understand the scope of experiments in the field of coral conservation.

- Soft skills developed (communication, teamwork, problem-solving)

During the power outage, I gained skills such as resilience, resourcefulness, and communication. Instead of working on a computer, I was able to confabulate with some of the more experienced interns or volunteers at the organisation, who provided me with advice such as the future possibilities of marine biology, the profitable streams, and the latest research. I also had to interact with another intern to work on the annual report for Coastal Impact, since we had been assigned this task cooperatively. We discussed what to include and how to present information professionally in the report.

- Industry knowledge acquired about coastal management/environmental issues

A critical element of working in a marine conservation organisation, I discovered, was the legal requirements needed to fulfil even day-to-day tasks. The documentation, permissions, and financial help needed to complete projects were abundant. Lastly, I learnt that local community engagement played a significant role in the goal that Coastal Impact wished to achieve — without the understanding and support of stakeholders like fisherfolk and traditional users, the time taken to reverse the negative effects of human intervention on the pelagic ecosystem would be significantly extended.

Challenges and Problem-Solving

- Difficulties encountered during the week

Due to the monsoon season, the connectivity posed an issue during working hours. At the time, I was assigned to logging organism data on iNaturalist. Hence, I was unable to work on this task due to the internet outage. Another challenge I faced was identifying species and seafloor composition during my analysis of quadrat and transect data. Since there were many viable options present and the image was often unclear, it was a challenge to identify the image's components correctly.

- How were the challenges addressed?

To continue working despite the network obstacles, I was instead tasked with creating the annual project report for 2024 - 2025 remotely. After Mr. Venkatesh Charloo, the organisation's founder, gave me access to the company's activity files, I was able to compile the information and create a comprehensive report. The report featured the projects completed and outreach in the year, as well as the prospects of the organisation. To correctly analyse quadrat data, Mr Jeremy helped me understand which features could be identified and corresponded to the different categories present on the analysis software. After a few turns of identifying components with Mr Jeremy's help, I was successfully able to perform this task unassisted, at least to a certain extent.

- Lessons learned from overcoming the obstacles

As a result of overcoming these obstacles, I realised the realities of working in remote locations and the sporadic successes of an experiment-based organisation. While the lack of internet access irked me, I understood that full-time personnel were habituated to such hurdles and were able to efficiently use their time to perform other tasks not reliant on the internet.

Conclusion

- Overall assessment of the internship experience
- How does it relate to your interests, career goals, and academic studies?

After writing a research paper on coral microfragmentation, I wanted to translate my theoretical knowledge into practical skills through an internship at a marine conservation-focused organisation. After volunteering at Coastal Impact, I gained a clearer idea of the future of marine conservation as a field of study. Hence, it was a direct extension of the work I had already done in the field. It also deepened my interest in this field of marine sciences and gave me a better understanding of what a future career in such an organisation may look like.

- Future engagement possibilities

9. Appendices

- Selected daily log entries (*as supporting evidence*)
- Photos (*only after taking Mr Charloo's/Jeremy's consent*)
- Documents or materials referenced (*if you do the research mentioned in point 7*)

