



# *Philippines*

Annual Report  
2018



Coral Cay Conservation; Philippines. Annual Report – 2018

Tom Dallison  
Head of Science, Coral Cay Conservation  
Email: [headofscience@coralcay.org](mailto:headofscience@coralcay.org)

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This document is intended to provide an annual overview of efforts throughout 2018 on Coral Cay Conservation's Philippines project; The Southern Leyte Coral Reef Conservation Project.

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Coral Cay Conservation  
The Kiln  
Grange Road  
Tongham  
Surrey  
UK  
GU10 1DJ

[info@coralcay.org](mailto:info@coralcay.org)

+44 (0) 0207 620 1411

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# A Note From OUR HEAD OF SCIENCE

This annual report has been written to provide readers with an overview of our (Coral Cay Conservation's) efforts throughout 2018. Within the report, there are summaries of each area that was ecologically surveyed in 2018, alongside respective community outreach events.

It has been a tireless year for Head Office staff, but more so, our dedicated field staff who have worked tremendously hard to increase our impact in-country. For the past couple of years, we have been operating behind our survey schedule with analysis of data and subsequent spatial management recommendations taking too long to reach the local beneficiaries, and although still impactful, we recognised our influence could be improved. In 2018, however, we are now in a stronger position, being able to submit our recommendations in quick response, not only enabling an efficient reaction time but also being pre-emptive; responding to indicators and minimising impacts before they truly develop.

To further increase our efficacy within Southern Leyte, in 2018, we announced our Before-After-Control-Impact protocol. Utilising previous efforts by CCC, since 2013, we are aiming to quantify the benefit of small-scale MPAs within Southern Leyte, whilst also highlighting their barriers to success, assessing the mechanisms

and protocols to their respective establishment. Through this Before-After-Control-Impact protocol, we will be able to provide a true indication of the status of small-scale MPAs in Southern Leyte, understanding if they provide the local user group with the benefits intended at the time of establishment.

With an increasing human population and unprecedented global, and localised, impacts to coral reefs and their associated systems, it is essential, that as a network of environmental stewards, we act against such perturbations. Aim to secure sustainability, resilience and a harmonious future between humans and the environment for future generations.

As always, we are grateful to our dedicated staff and volunteers, who give their time and effort to our Philippines project, without whom, none of this would be possible. I would also like to thank our Scientific Advisory Committee for their expert advice in developing CCC's approaches and projects. A special thank you, also, to our project partners for their continued support.



Tom Dallison  
*Head of Science*

# CORAL CAY CONSERVATION

Coral Cay Conservation (CCC) believe in a future where our choices today will benefit the generations of tomorrow, where coral reefs will sustainably provide for local communities in the face of growing demand, allowing these systems to thrive in harmony with humankind.

Initially founded in 1986, CCC is an internationally renowned, non-governmental organisation (NGO), which provides host countries with appropriate resources and scientific capacity for the protection and sustainable use of tropical ecosystems. CCC understand that successful conservation hinges on a holistic approach where equal measure is given to the collection of scientific data, education and capacity building. Therefore, this three-tiered approach lies at the heart of all our projects. As such, CCC's mission is;

*"Providing resources to help sustain livelihoods and alleviate poverty through the protection, restoration and management of coral reefs and their associated ecosystems"*

This mission is achieved through the formulation of strong, long-term programmes of collaborative research with local institutions, governments and stakeholders. Such research programmes require technical support from CCC, in the form of scientific resource appraisal, data analysis, and the production of reports and integrated marine spatial management recommendations. CCC further provides communities with opportunities for science-based education, sustainable resource utilisation training and management to strengthen local capacity to the point where research can be continued independently by the host country.

Furthermore, CCC advocate a citizen science framework through a self-financed volunteer participatory programme. CCC do not receive monetary payment for respective conservation services in-country and is therefore reliant on self-financing and external funding sources to continue undertaking conservation focused projects.

CCC has been successfully operating volunteer based conservation programmes in developing countries for 33 years with several internationally notable accomplishments, including the establishment of MPAs around the world. This includes but is not limited to the creation of the UNESCO World Heritage Site in Belize, and the Danjungan Marine Reserve and Wildlife Sanctuary for Negros in the Philippines. To date, CCC have been instrumental in the establishment of 11 Marine Protected Areas (MPA) around Sogod Bay, Southern Leyte, the Philippines.



# 2018

## IN NUMBERS

11

Barangay  
coastal waters  
surveyed

58

Transects surveyed  
by CCC  
volunteers

232

individual  
replicates  
sampled

24.666

Target fishes  
identified

2.920

hard coral  
colonies  
recorded

25

amazing  
volunteers passed  
through CCC's  
doors

9

Filipino scholars  
trained

237

hours spent  
underwater  
surveying

# DATA COLLECTION & RESOURCE APPRAISAL

In 2013, CCC adopted a new survey methodology, marking Phase II of the LRCP. This new methodology highlighted a shift in CCC's structure and purpose in Southern Leyte. Phase II aimed to facilitate in the establishment of small-scale, Barangay-managed, MPAs whilst providing scientific capacity to stakeholders to enable the monitoring and assessment of already established MPAs; assessing their ability as an effective management tool. Phase II was concluded in 2018 with the adoption of Phase III. Whilst the intrinsic protocols of Phase II remain, Phase III deploys them under different aims and objectives; enabling CCC to quantify the success of MPAs throughout Sogod Bay.

Monitoring allows resource managers to implement changes, where necessary, to adapt policies and by-laws. Monitoring and assessment also provides information to detect changes in conditions that may trigger a management response; determine the cause of such changes of concern, and to ultimately evaluate the effectiveness of management actions; a key element that provides continuous feedback. By providing ecological data, comprehensive MPA surveys enable managers to assess progress towards aims and goals and make informed, ecological management decisions. Furthermore, the continued drive for establishment, based

on sound ecological evidence, has built resilience throughout Sogod Bay, whilst promoting suitable use of marine resources, ultimately improving stakeholder wellbeing.

MPA assessments are conducted using an augmented Reef Check method. The Reef Check methodology is widely recognised and is used to survey coral reefs around the world. It is a mode of Underwater Visual Census (UVC) that allows for a diverse range of divers to easily and efficiently conduct surveys, with respectable results. CCC has enhanced the methodology through additional target species of fish, coral and other invertebrates to better reflect the high biodiversity within Sogod Bay. Survey transects are conducted at depths of 6m and 12m where topography allows, both inside and outside of an MPA. The total number of transects assessed depends on the size of the target MPA, with a minimum of three inside and three outside. Each transect is 100m and divided into 4 replicates of 20m. Between each replicate there is a 5m gap where no data are recorded.

The data are analysed and assimilated into reports that provide a holistic overview of the current ecological status of the MPA and its respective reef. Finally, CCC provides recommendations to the barangay council on how to progress and either, maintain or achieve success.





## BACI

Before-After-Control-Impact (BACI) studies are an uncommon approach utilised for assessing the efficacy of small-scale MPAs with varying aims and objectives (e.g. protection of fish assemblages, benthic communities, and commercial biomass for fishery support), inhibited by the inability to retain baseline ('Before') data before the establishment of an MPA ('Impact') <sup>[1]</sup>. Due to the limited accessibility to, or collection of, baseline data on unperturbed sites, spatial studies on small-scale MPAs, that aim to assess the impacts of MPA establishment, inherently result in the introduction of bias that significantly influences results via site-choice artefacts. The spatial comparison of sites can prove hazardous with the protected areas often presenting higher levels of biodiversity and coral cover in comparison to areas that are not protected therefore naturally being presented in a greater state of 'health' without providing further clarity on its respective performance over time. This influence of bias on results reduces the ability of conservation-advisors to provide sound recommendations to resource managers on the performance of their MPA. Therefore, spatial studies that focus on an MPA's efficacy through comparative analysis should be used with caution with temporal studies, where feasible, taking precedence.

The utilisation of a BACI approach enables the temporal assessment of the impact of an MPA within the localised area of study and due to the study-site dependent upon

baseline data, bias of comparative site selection is reduced.

As aforementioned, CCC has undertaken two phases; Phase I (2002-2013) conducted ecological baseline studies of the reefs on the coastline of Sogod Bay; Phase II (2013-2018) saw the utilisation of those data, accompanied with higher resolution spatial studies, to support the establishment of small-scale MPAs. The outputs of these phases provided CCC with a unique opportunity to utilise baseline data that aimed to provide local stakeholders with recommendations for MPA establishment to provide resource managers with critical data on the performance of their MPAs.

CCC will, therefore, incorporate the MPA MEAT (MPA Management Effectiveness Assessment Tool), in combination with the BACI approach, to enable the true assessment of MPA efficacy whilst highlighting key barriers to success in their establishment and performance – both key components of developing effective marine spatial management practices whilst evaluating management impacts.

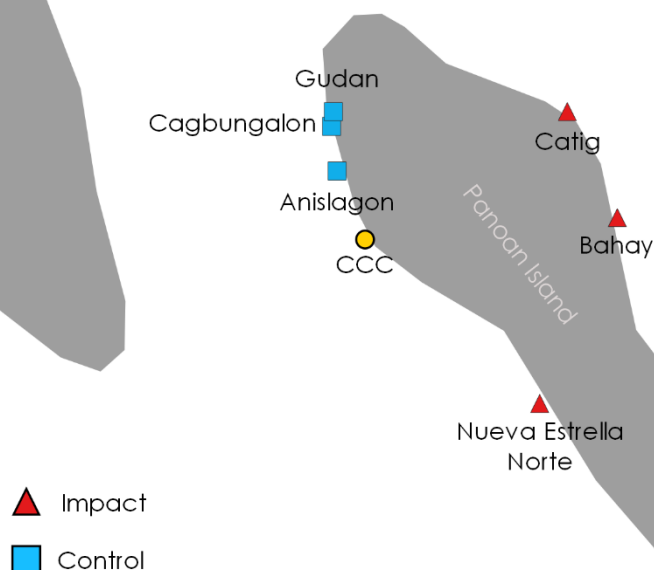
### Aims

*To evaluate the efficacy of small-scale MPAs in coral reef-dominated coastal regions and understand their barriers to success.*

To understand the impact of small-scale MPAs on the ecological communities and local stakeholders, CCC will address the following four-questions;

<sup>[1]</sup> Bonaldo, R., Pires, M., Guimarães, P., Hoey, A. and Hay, M. (2017). Small Marine Protected Areas in Fiji Provide Refuge for Reef Fish Assemblages, Feeding Groups, and Corals. *PLOS ONE*, **12**(1), p. e0170638.

Sogod Bay



1. Do MPAs result in an increase in diversity, density, and/or biomass of fishes in comparison to un-protected areas?
2. Do MPAs result in an increase in scleractinian coral cover and a decrease in macroalgal cover in comparison to un-protected areas?
3. Are small-scale MPAs supported by local stakeholders?
4. Do small-scale MPAs hold the necessary governance and support to ensure success?

### Approach

Two site categories 'Impact' and 'Control' will be defined to select sites, selected from 29 previously surveyed independent sites in Sogod Bay. An 'Impact' site will be defined by a site that has been previously surveyed by CCC to provide recommendations for an MPA to be established with the respective being acted upon and an MPA resultingly being established. In this context, the MPA establishment is considered as the 'Impact'. 'Control' sites are defined by surveys being undertaken, with recommendations provided but these

have not yet been acted upon and therefore, no MPA has been established.

The survey area for 'Impact' sites will be defined by the established MPA's boundaries (as supplied by PGSL and PAME). Survey area for 'Control' sites will be defined by historic CCC spatial recommendations submitted in the Scientific pre-MPA Assessment Reports, incorporating previously surveyed areas. 'Before' data have already been collected, with 'After' data being collected in 2018 with further surveys continuing into 2019.

The data collection protocol, whilst not differing from CCC's *modus operandi* [2], will focus on: fish diversity and density; commercially important fish density, biomass and length-frequencies; Scleractinian coral colony and lifeform composition; and benthic macro-algae composition. Additionally, abiotic environmental data will also be collected. Transects will also be placed haphazardly due to GPS inaccuracies when attempted to replicate transect placement. Further analysis will be undertaken to understand the influence of haphazard placement on biophysical data.

To gauge the level of awareness of stakeholders, their perceived benefits from the MPA, their perception on the functionality of the management body and their willingness to support the MPA, a Community Perception Survey (CPS) will be conducted within the respective communities of 'Impact' sites where an MPA has been established. CPS's will also be accompanied by MPA MEAT surveys [3]. The MPA MEAT surveys will assess the established MPA's level of governance and its respective effectiveness and management.

The BACI scientific report is intended to be made available for distribution from September 2019 onwards. Preliminary results (mean fish abundance and hard coral cover) from surveyed sites are discussed in greater detail in the following sections.

[2] Heney, C and Dallison, T. (2019). Coral Cay Conservation Philippines; Current Ecological Status of Barangay Himbangan Coral Reef and Proposals for Future Management Practices. Coral Cay Conservation.

[3] National CTI Coordinating Committee (2019). MPA MEAT (Marine Protected Area Management Effectiveness Assessment Tool). Quezon City: National CTI Coordinating Committee, pp.1-15. Available at: [www.coraltriangleinitiative.org/sites/default/files/resources/MEAT%20e-form.pdf](http://www.coraltriangleinitiative.org/sites/default/files/resources/MEAT%20e-form.pdf) [Accessed 31 May 2019].

# PRELIMINARY RESULTS

Following 2018 efforts, preliminary analysis on the nominated sites has provided some initial interesting results. Below you will find a summary of preliminary results as well as the conditions of each surveyed site when originally surveyed.

## Control Sites

Sites nominated as 'Control' sites to satisfy the requirements of the BACI protocol, Anislagon, Gudan and Cagbungalon, were originally surveyed in 2016, 2015 and 2014, respectively. Each site was originally selected for surveys, during Phase II of the LRCP, following requests from CCC's project partners, PGSL and PENRMO.

Overall, in 2016, the mean fish abundance at Anislagon (Fig. 1) was  $49.42 \pm 15.49$  500m<sup>3</sup><sup>-1</sup>, which was deemed to be uniform throughout the survey area, demonstrating no signs of differing abundance between individual transects. Furthermore, the community composition of recorded fishes was deemed to be diverse and even. Commercially important fishes were recorded in low abundance, however, ( $2.92 \pm 1.64$  500m<sup>3</sup><sup>-1</sup>) holding a mean standing biomass of  $0.06 \pm 0.10$ kg 500m<sup>3</sup><sup>-1</sup>. These results are similar to those recorded at Gudan in 2015 where fish abundance was also considered low ( $94.94 \pm 23.86$  500m<sup>3</sup><sup>-1</sup>), in relation to other sites throughout Sogod Bay. There was a high variability in fish abundance between transects at Gudan, ranging from  $45.25 \pm 6.57$  500m<sup>3</sup><sup>-1</sup> to  $175 \pm 80.45$  500m<sup>3</sup><sup>-1</sup>, however, the samples demonstrated a high diversity with the majority of target fishes present.

Fish abundance was recorded in similar abundances in 2014 within the coastal waters of Barangay Cagbungalon (adjacent to Gudan), with the highest abundances of fishes recorded as  $73.80 \pm 32.80$  500m<sup>3</sup><sup>-1</sup> and lowest as  $23.30 \pm 9.90$  500m<sup>3</sup><sup>-1</sup>. Commercially important fishes

were recorded in low abundances throughout the survey site.

In terms of substrate composition across all three sites, rock (30.10%) was the dominant substrate at Anislagon whereas sand dominated Gudan (38.59%) and Cagbungalon (41.46%). Scleractinian coral composition ranged between sites with Gudan recording the lowest composition at  $16.72 \pm 3.16\%$ , followed by Cagbungalon with a composition of  $17.27 \pm 2.88\%$  and Anislagon with  $22.71 \pm 2.67\%$ .

Following re-surveying in 2018, all three sites preliminary indicate an increase in both the abundance of fishes and the composition of Scleractinian hard corals. Anislagon presented the greatest increase in the abundance of target fishes, with a 66% increase to a mean abundance of  $81.45 \pm 9.23$  500m<sup>3</sup><sup>-1</sup>. The abundance of fishes in Cagbungalon remained stable, increasing by 1% where as Gudan, recording the greatest fish abundance in relation other control sites, increased by 16% to  $110.13 \pm 17.47$  500m<sup>3</sup><sup>-1</sup> (Fig. 2a).

The composition of Scleractinian hard corals also increased at each site, with Cagbungalon recording the greatest increase of 84%, followed by Gudan and Anislagon (63% and 40% respectively). In 2018, both Cagbungalon and Anislagon hosted the greatest composition of hard corals with  $31.77 \pm 2.52\%$  and  $31.77 \pm 2.07\%$ , respectively.

When the control sites are considered collectively, fish abundance increased by 21% from a mean of  $69.10 \pm 8.60$  500m<sup>3</sup><sup>-1</sup> to  $83.68 \pm 6.23$  500m<sup>3</sup><sup>-1</sup>, with scleractinian hard coral composition demonstrating a greater temporal increase, increasing from  $19.25 \pm 1.67\%$  to  $28.69 \pm 1.45\%$  (49%).

It must be noted, however, that during surveys in 2018, CCC were informed by PENRMO and Barangay Captains during Community Perception Surveys, that both

Anislagon and Gudan had established MPA's within their respective coastal waters. Although these MPAs were not established based on CCC's recommendations, and did not overlap with surveyed transects, further analysis will need to be undertaken to understand the potential cause-effect and influence on control transects through spill-over and larval dispersal as well as displacement of fishing pressure.

### Impact Sites

Barangay Bahay, Catig and Nueva Estrella Norte were all surveyed as Impact sites in 2018 due to each respective Barangay establishing marine spatial management ordinance subsequent to CCC's recommendations.

Bahay was originally surveyed in 2012 by CCC and results indicated a reef system that was experiencing high anthropogenic pressure through destructive fishing practices, over exploitation and discarded waste. Commercially important fishes were recorded in low abundances, alongside low abundances of herbivorous species. Hard coral, however, was the dominant substrate ( $27.90 \pm 4.59\%$ ), composed mainly of non-Acropora branching species. Subsequent to the dissemination of results to the barangay Council of Bahay in 2014, CCC recommended the establishment of an MPA. As a result, Barangay Bahay declared the establishment of an MPA in 2016, composed of a No-Take Area (27ha) and Marine Reserve (50ha).

Due to different target fishes recorded in 2012, fish abundance was excluded from the preliminary analysis of Bahay's MPA. However, Scleractinian hard coral composition change was included and indicated a 47% decrease in cover ( $14.79 \pm 2.36\%$ ) in 2018. This result is further supported by MEAT surveys undertaken in 2018 in which the MPA could not satisfy any criteria and therefore was awarded Level 0 status. Although the MPA scored highly on Community Perception and level of enforcement whilst also holding the correct Legal Instruments, the MPA is without a

management plan (0/9 score), possibly contributing to its poor performance.

Barangay Nueva Estrella Norte and Barangay Catig were both surveyed in 2015 by the Pintuyan and Liloan Municipal Agricultural Office (MAO), respectively. The abundance of target fishes within the surveyed area of Nueva Estrella Norte was considered variable throughout the site with a mean abundance of  $51.06 \pm 3.33$   $500\text{m}^3^{-1}$ . In addition, commercially important fishes, such as Snapper and Grouper, were recorded in low abundances, and although Parrotfish were the most abundant of the three, were all small in size, with most large adults absent from the observed population. Similar fish abundances were recorded at Barangay Catig, with a mean abundance of  $48.68 \pm 5.96$   $500\text{m}^3^{-1}$  and low abundances of all three commercially important fish families, with 85% of recorded Parrotfish below 10cm in length.

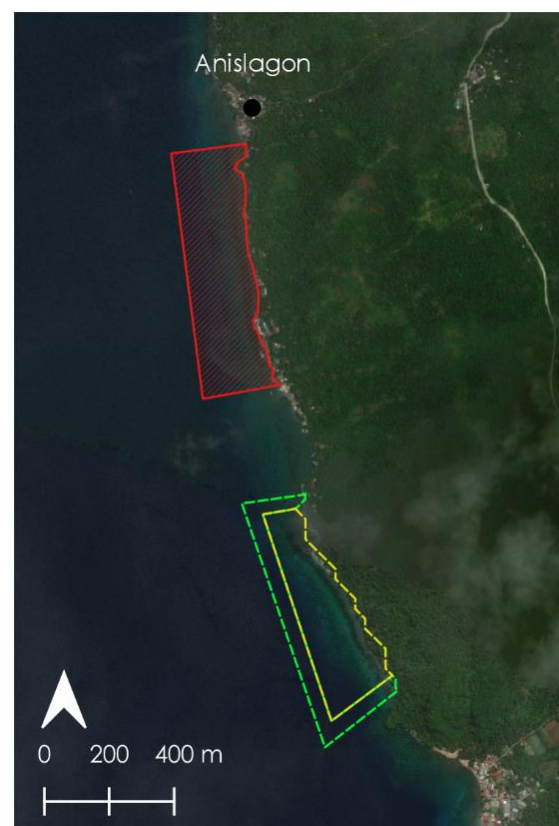


Figure 1. Barangay Anislagon with newly established Marine Protected Area (21ha) (red) with CCC's 2016 spatial management recommendation with No-Take Area (NTA) (yellow) and Marine Reserve (MR) (green).

During initial surveys in 2015, Nueva Estrella Norte and Catig both recorded Scleractinian hard coral as the dominating substrate ( $39.23 \pm 3.33\%$  and  $29.06 \pm 4.73\%$ , respectively), with rock, sand and rubble all contributing in large compositions.

Following 'After' surveys at each site, Nueva Estrella Norte demonstrated an increase of 122% in fish abundance ( $113.38 \pm 15.82 \text{ } 500\text{m}^3^{-1}$  in 2018) with Catig increasing by 87% to  $90.96 \pm 10.34 \text{ } 500\text{m}^3^{-1}$ . Nueva Estrella Norte also demonstrated a relatively sizeable increase in coral composition, increasing to  $54.69 \pm 3.30\%$  (39%). Although an increase at Catig was observed, it was minimal, increasing by 3%.

Impact sites as a whole demonstrated a 97% increase in fish abundances ( $50.05 \pm 4.07 \text{ } 500\text{m}^3^{-1}$  to  $98.79 \pm 9.67 \text{ } 500\text{m}^3^{-1}$  in 2018) whilst scleractinian coral cover showed minimal change, with a 4% increase to  $33.16 \pm 3.05\%$  (Fig. 2), heavily influenced by the observed decrease at Bahay.

Both MPAs in Nueva Estrella Norte (14.60ha) and Catig (72.21ha) were established in 2016, protecting a total area of 86.81ha. Following MEAT surveys in 2018, both MPAs did not satisfy requirements to receive Level 1 status, with Nueva Estrella Norte being graded as 'Fair' and Catig, with 29 out of 84 awarded points, graded as 'Good'. Whilst both MPAs provided evidence for legal instruments and community participation, each did not provide evidence of a management plan or management body, most likely inhibiting each MPAs respective performance.

Preliminary analysis indicates that the coral reefs and their associated fish communities throughout Sogod Bay are not suffering the same plights experienced by other reefs throughout the Philippines and the wider region. Furthermore, results suggest that the established MPAs are providing ample protection to fauna within the established boundaries, however, it is apparent that MPAs do not have the resources to ensure maximum output and are being inhibited in performance.

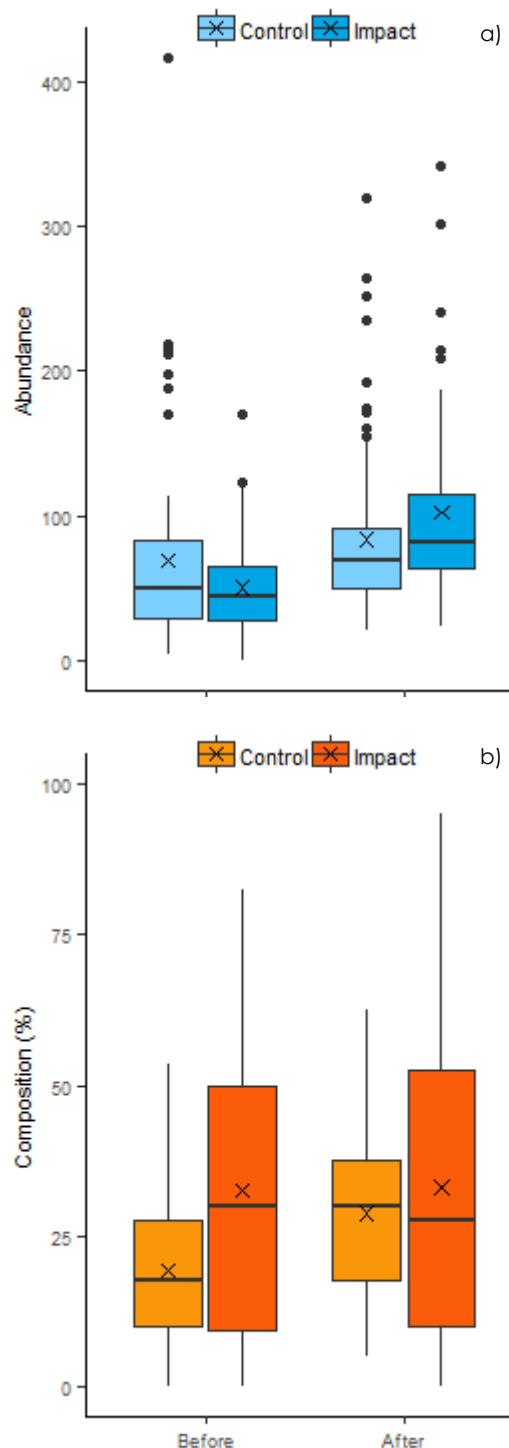


Figure 2. Before-After-Control-Impact box-whisker plots with means (cross) for amalgamated fish abundance ( $500\text{m}^3^{-1}$ ) (a) and Scleractinian hard coral composition (%) (b) data for each respective group; Control and Impact Sites.

# NAPANTAO FISH SANCTUARY

In 2018, CCC published results from surveys undertaken in 2017 on the Napantao Fish Sanctuary and continued in the bi-annual cycle of survey efforts in 2018. Each spatial bi-annual survey is a component of a larger temporal study that has been conducted each year since 2013. Studies of the Napantao Fish Sanctuary aim to provide temporal analysis on the performance of the protected area through the analysis of biophysical data that are collected inside and outside of the Fish Sanctuary's boundaries. Whilst spatial studies each year provide an annual snapshot of the current ecological status of the reef, temporal analysis enables CCC to understand changes in ecological status, fish community assemblage, presence, and biomass, of commercially important fishes as well as the health of benthic communities, including substrate compositions. CCC utilise the

understanding of changes in the reef communities and responses to detrimental events or activities to provide recommendations to Barangay Napantao's council and stakeholders; working towards a more sustainable future.

To monitor Napantao Fish Sanctuary, CCC, in 2013, installed six permanent transects; three located inside the protected area and 3 located outside, at a depth of 12m (Fig. 3). CCC then deploy biophysical survey protocols twice a year, to minimise influence of seasonality, that mimic protocols utilised to undertake spatial assessments throughout the bay to facilitate in protected area establishment. In addition to *in-situ* monitoring techniques, CCC also hold interviews with the Napantao Barangay Captain to understand the ordinance and resources supporting the Fish Sanctuary. A key

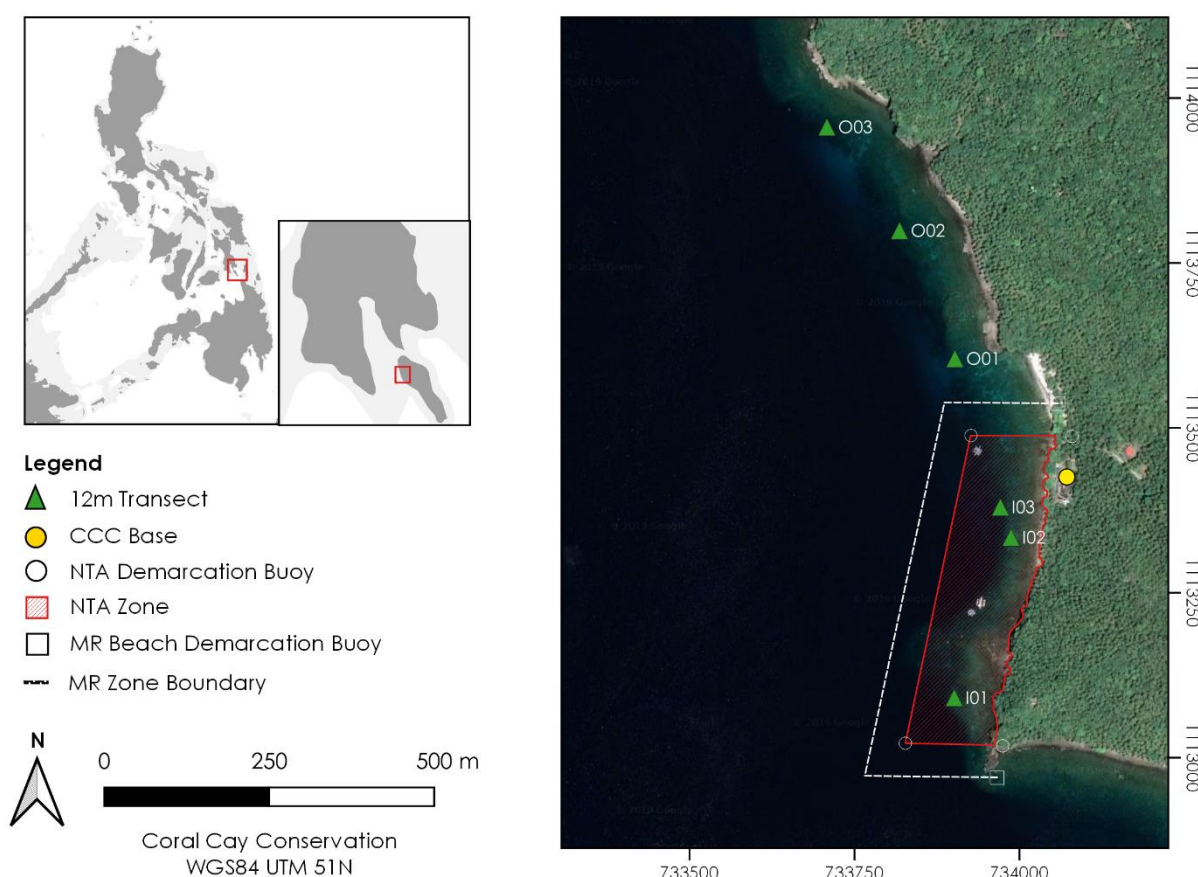


Figure 3. 100m permanent transect placement for the biannual monitoring of Barangay Napantao Fish Sanctuary, undertaken by Coral Cay Conservation, Southern Leyte.

element of the Napantao Fish Sanctuary are entry fees that provide a steady source of income to support the sanctuary which are paid by dive groups when entering the protected area, including CCC.

Results from the 2017 spatial study indicated that the sampled fish communities were greater in individual abundances as well as diversity (Species Richness and Shannon-Weiner Diversity index) inside the fish sanctuary than communities present outside of the boundaries, without protection.

Furthermore, a greater abundance of commercially important fishes inside the MPA ( $14.96 \pm 2.37 \text{ } 500\text{m}^3^{-1}$ ) was recorded compared to outside ( $5.00 \pm 0.94 \text{ } 500\text{m}^3^{-1}$ ), as well as a greater frequency of those fish being in the higher size classes (48 individuals over 21cm inside, including 4 over 31cm, compared to only 5 over 21cm outside, none of which were over 31cm); a positive indication of the Sanctuary's performance as it suggests present individual fish are able to grow to maturity under its respective protection.

Whilst invertebrate surveys provided data that indicate communities are relatively species rich and abundant, the sanctuary was found to be having minimal influence,

with no major differences recorded transboundary. Giant Clams (*Tridacna gigas*), however, did indicate to be benefiting from protection, with individuals recorded inside the sanctuary being bigger, and more abundant, with 4 individuals recorded greater than 31cm, in contrast to their respective counterparts outside of the boundaries (all individuals were <20cm).

Regarding the composition of biotic and abiotic substratum on the Napantao reef, inside the sanctuary, the dominating substrate was hard coral (53.44%) (Fig. 4), followed by rock (15.32%) and other substrates (12.08%  $20\text{m}^{-1}$ ), with Scleractinian hard-coral composition exhibiting all three life traits: stress tolerant coral, competitor coral and fast-growing coral (38.01%, 27.88% and 34.11% respectively). Outside the sanctuary, the dominating substrate was also hard coral, though with a lower coverage than inside (40.42%) (Fig. 4), followed by sand (21.88%) and rock (11.98%). As with inside the boundaries, the hard-coral present exhibited all three life traits: stress tolerant coral, competitor coral and stress tolerant coral (31.70%, 28.35% and 39.95% respectively).

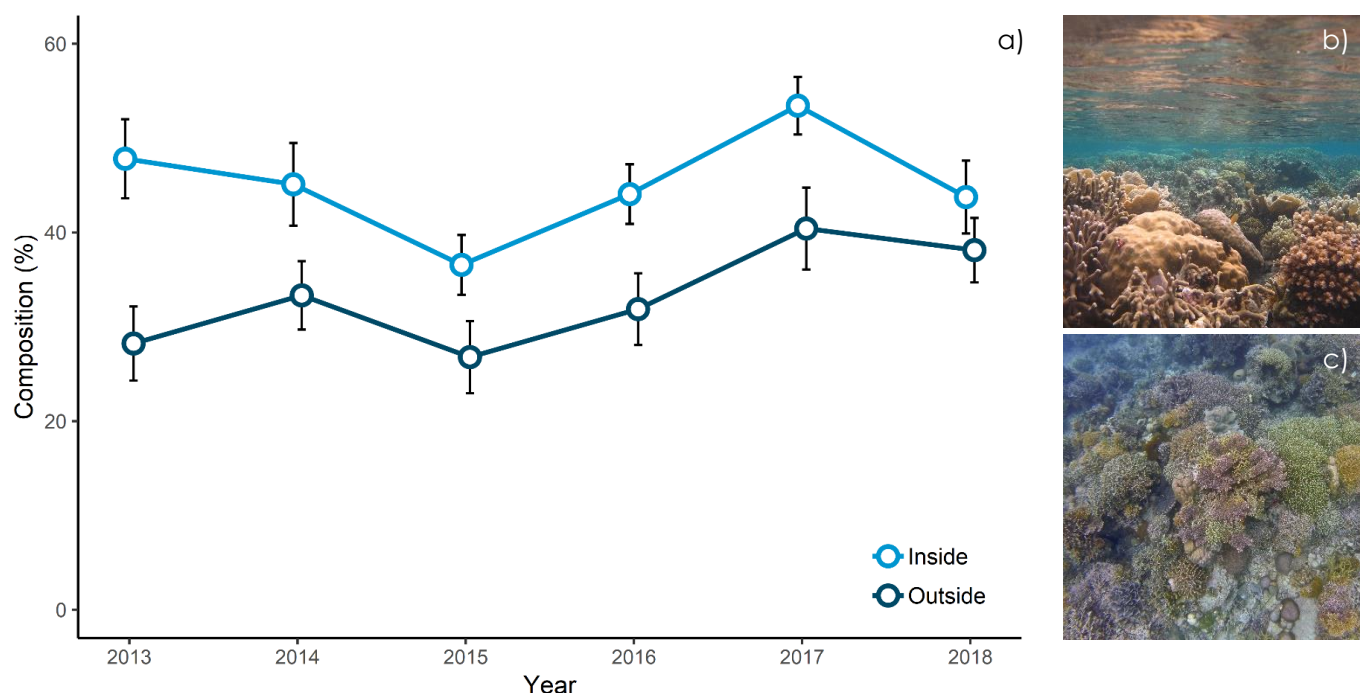


Figure 4. Scleractinian hard coral cover recorded from 2013 to 2018 both inside and outside the Napantao Fish Sanctuary by Coral Cay Conservation from  $n = 6$  100m permanent transects (a) and photographs of inside the Napantao Fish Sanctuary in 2014 (b) and 2017 (c).

Overall, anthropogenic impacts were lower inside the sanctuary in comparison to outside. However, general trash was still found on an average of 54% of replicates inside, compared to 88% of replicates outside. Unfortunately, levels of fishing trash found within the sanctuary were similar to that outside (33% and 29%, respectively) but counts were considered low. One replicate also showed signs of boat/anchor damage inside the boundaries.

In comparison, 2018 results replicated those found in 2017 in regard to the abundance of fishes, and the respective diversity of fish communities, with all greater inside the sanctuary than those recorded outside. Whilst minimal increases in fish abundance inside the sanctuary were recorded between 2017 and 2018, outside the sanctuary, fishes increased in abundance by 23.52% to  $106.33 \pm 14.96 \text{ } 500\text{m}^3^{-1}$ .

The abundance of commercially important fishes also increased both within ( $18.88 \pm 2.07 \text{ } 500\text{m}^3^{-1}$ ) and outside ( $10.38 \pm 1.09 \text{ } 500\text{m}^3^{-1}$ ) of the sanctuary by 25.87% and 107.60%, respectively. Furthermore, in 2018, the recorded biomass of commercially important fishes was significantly greater inside the sanctuary in comparison to the biomass recorded outside of the sanctuary.

Inside the sanctuary, the dominating substrate was hard coral ( $43.75 \pm 3.86\%$ ), presenting an 18% decrease from 2017, most likely due to frequency of coral damaging storms recording between survey periods. Hard coral was present exhibiting all three life traits: stress tolerant

coral, competitor coral and fast-growing coral (34.76%, 30.48% and 35.76% respectively). Outside the sanctuary, the dominating substrate was also hard coral ( $38.13 \pm 3.41\%$ ), a 6% decrease from 2017 (Fig. 4). As with inside the boundaries, the hard-coral present exhibited all three life traits: stress tolerant coral, competitor coral and fast-growing coral (35.25%, 33.88% and 30.87% respectively).

Results from both the 2017 and 2018 assessment of Barangay Napantao's fish sanctuary suggest management is good but there is room for improvement. For example, the installation of a permanent Bantay Dagat to enforce the ordinance of the sanctuary and address incidences of illegal exploitation or detrimental boat mooring would drastically improve the sanctuary's performance. The high overall abundance of fish within the sanctuary compared to others around Sogod bay, coupled with high levels of diversity, suggest laws prohibiting fishing are being followed. Though numbers of fishes tended to differ significantly inside and outside the boundaries, invertebrate numbers were fairly similar. These results are similar to previous years and could suggest a plateau in recruitment/recovery. One issue that must be addressed is the level of trash, both general and fishing. Although it is possible it is drifting in from further afield, local improvements and an increased social responsibility amongst stakeholders will minimise the introduction of point-source waste.



# COMMUNITY OUTREACH & CAPACITY BUILDING

It is CCC's cornerstone belief that marine conservation goes hand in hand with education and economic development, understanding that successful conservation hinges on a holistic approach where equal measure is given to the collection of scientific data, education and capacity building. Therefore, throughout the LRCP, great emphasis has been placed into education and outreach efforts, providing stakeholders with the knowledge and skills to explore new careers; reducing the number entering the fishery.

The implementation of educational programmes has provided thousands of children, students and adults with a better understanding of the marine environment, resource management and sustainable practices within Sogod Bay. Many of the barriers to successful conservation have their roots embedded in cultural, social and traditional practices. Therefore, working in coordination with, and supporting, local subsistence-based communities, the active efforts of CCC's enthusiastic staff are an essential component of the LRCP.

Through the successful implementation of education initiatives, CCC are increasing understanding and compliance to modified management policies with sustainability at the core, thereby driving a co-management approach to ecosystem-based management (EBM) throughout Southern Leyte. CCC place great efforts into the dissemination of results and contextualising recorded threats and respective solutions to MPA and marine resource stakeholders whilst focusing on raising awareness amongst, and inspiring children and students; the next generation. By raising awareness and inspiring future generations, CCC aims to alter perceptions and overcoming the barriers to success,

incorporating sustainability; driving social responsibility within local communities.

Throughout 2018, celebrating the 3<sup>rd</sup> International Year of the Reef (IYOR2018) <sup>[4]</sup>, CCC undertook various outreach initiatives ranging from community days with local barangays to large-scale beach cleans with neighbouring municipalities. It must be noted, however, that CCC experienced delays in obtaining the correct documentation to work with local schools in 2018 and as such, were limited in the events that could be undertaken, this includes SEAS and Reef Rangers.

Furthermore in 2018, CCC took great strides in addressing the plight of ocean plastics. With unprecedented amounts of plastic waste entering the oceans through mismanagement and considering that 81% of all plastic in the Philippines are considered mismanaged <sup>[5]</sup>, it is imperative that the importance of waste management and the impact that poorly managed plastics have on the marine environment is included in CCC's outreach initiatives.

Each event conducted is included below with a brief summary.

## Anislagon Community Day

11.04.2018

CCC returned to Anislagon to conduct a community day, due to survey efforts seeing the re-assessment of Anislagon's reef. Whilst this community day was a celebration on taking a step towards a more sustainable future, it was also a reminder that MPA's don't manage themselves, and they require communal support. Whether they are fisherman or farmers, they all have a vital role to play in protecting Anislagon's marine resources; for themselves and future generations.

<sup>[4]</sup> [www.iyor2018.org](http://www.iyor2018.org)

<sup>[5]</sup> Ritchie, H. and Roser, M. (2019). *Plastic Pollution*. [online] Our World in Data. Available at: <https://ourworldindata.org/plastic-pollution> [Accessed 31 May 2019].

Around 20 members from the community attended the morning event with great enthusiasm. CCC's Community Liaison Officer and Scholar lead the presentations in Visayan, generating awareness of the problems and threats associated with plastic items, adding a game of trivia to give an understanding on the scale of the issue. Whilst the problem of plastic gets bigger, CCC aimed to team up with the community of Anislagon to create a solution: Ecobricks <sup>[6]</sup>. A workshop was conducted by Jesse on the tools required to create an Ecobrick, and the sheer number of objects and buildings that can be made with them. All the learning was applied by conducting a beach clean to collect the items that could be used inside of an Ecobrick, followed by an Ecobrick making workshop.

### CCC Napantao Eco-Walk

09.05.2018

CCC staff and volunteers were excited to undertake the first ever Eco-walk. After learning about plastics and their implications in our environments and oceans, the team was ready to target those trash items that could be used to make the innovative Eco-bricks. A collection bag for targeted plastics, in addition to one for debris not useable for making Eco-bricks, were brought along in order to collect as much trash as possible around the Napantao village. Although it is imperative to introduce individuals to the theories and implications of plastic debris, taking part in activities such as the Eco-walk aids people in seeing directly how their actions can make a difference in our communities, and in the environment.

### Cagbungalon Community Day

26.05.2018

Nearly 30 members of all ages from the community attended the morning event with great enthusiasm. One participant was already familiar with CCC as she had joined our recent Reef Rangers event in Napantao. Since CCC had been to Cagbungalon in previous years introducing MPAs and the importance of the community's support for their success, a different approach was undertaken for this community day. The topic of the day was the effect of plastic waste in the environment, and how this can be managed.

### World Ocean Day Anilao Beach Clean

09.06.2018

In celebration of World Oceans Day 2018, CCC staff and volunteers undertook a "surface interval beach clean" while offsite at Anilao. During the month of June, Habagat arrives yearly bringing with it changing winds and diving conditions. This week was CCC's first introduction to Habagat, and the team travelled offsite to undertake two SDP training days at the Anilao dive site. Regardless of the impromptu change in schedule, the team took advantage of having beach cleaning equipment including gloves, hessian sacks and weighing scales provided by 4Ocean. During the surface interval participants got busy cleaning up the hefty amount of trash found on the diving beach. Some of the volunteers even had the enthusiasm to bring sacs underwater for an Eco-fun dive. In total six full bags of trash were collected amounting to 15.2kg.





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## World Oceans Day in Liloan 29.06.2018

CCC celebrated the 2018 World Oceans Day in partnership with 4Ocean and the Local Government Unit of Liloan. An afternoon event including presentations, a synchronized coastal clean-up, a prize-draw and photo-competition brought together over 250 people from the surrounding communities. Groups partaking in the activity included the Municipal Environment and Natural Resources Office (MENRO) of Liloan, senior students of St. Ignatius Loyola Academy, students undertaking the Environmental Sciences course at Liloan's Technical Vocational Highschool, residents of Liloan city, Barangay Poblacion, Tacloban City and other surrounding communities.

2018's theme was selected as "*preventing plastic pollution and encouraging solutions for a healthy ocean*". In keeping with the theme, the municipality of Liloan joined in on provincial government efforts to name June as *Environment Month*, and officially launched their *rice from garbage* programme in addition to partaking in CCC's World Oceans Day celebration. The programme acts as an incentive for communities to partake in the making of eco-bricks (building blocks made from reused plastic wastes) to trade in for a given amount of rice.

[6] [www.ecobricks.org](http://www.ecobricks.org)

Throughout the day, all participants managed to collect 646kg in trash, most of which was destined for the Ocean!

## Gudan Community Day 21.07.2018

After surveying the reef of Barangay Gudan, which is a control site for this year's BACI protocol, CCC staff and volunteers returned to host a community day.

There was a huge turnout of all ages, including more than 30 enthusiastic children and their family members, some of which had attended a previous CCC community day in Gudan.

The focus of the event was to bring awareness to the negative impact of plastic waste on the environment, and what innovative solutions can be adopted to manage this ever-growing issue.

## Padre Burgos MPA Recommendation 24.08.2018

Since the biophysical assessments in 2016 and 2017, CCC analysed and disseminated research findings and recommendations to community members of Barangay Bunga and Santo Rosario. The aim was to recommend whether the establishment of MPAs would benefit these coastal zones, and if so, where the ideal placements would be. Accompanied by Armando Gaviola of PENRMO, Anik Levac, CCC's Project Scientist undertook a presentation of our results and recommendations at the

SB Session Hall of Padre Burgos on Friday August 24<sup>th</sup>. 15 interested parties attended the session, including representatives from both Barangays Bunga and Santo Rosario, in addition to Padre Burgos' Vice-Mayor.

### Bahay Community Day

29.09.2018

CCC returned to Bahay to conduct a community day, a follow-up to the recent survey efforts on the barangay's reef as an impact site from this year's BACI protocol.

Bahay's MPA was established 2 years ago and has now been revisited to assess the influence of the MPA on the protected reef. Nearly 50 members of all ages from the community attended the morning event and were very keen on learning about what CCC was all about. Since CCC visited Bahay prior to the community day, the event focused on what an MPA is and how it depends on the community for success, as well as the effects of plastic waste in the environment and how this can be managed.

### President Quezon MPA Recommendation

11.10.2018

After surveying the site last summer, CCC analysed the results in order to propose the most ideal area in which to establish an MPA. By considering fish and invertebrate diversity and abundance, in addition to scrutinizing commercially important species and interactions between reef organisms and substrates, it was deemed that

although the surveyed site showed signs of fishing impacts, it was in a good position for improvement both biologically and socio-economically; should an MPA be established.

After presenting CCC's recommendations, community members were asked to discuss the topic, and to speak their opinions. With positive and negative fronts, the discussion between Barangay Officials, community members and fisherfolk, with questions for our CCC representatives, ended in great success. The Barangay voted towards establishing an "No-Take Zone" in the area CCC recommended, as well as establishing a Marine Reserve, where only line fishing is allowed in a buffer zone, which will be connecting all the way down to the next Barangay's MPA, nearly 1km down!

### MPA Congress, Maasin

14.12.2018

CCC's Project Scientist was invited to speak at the second annual marine protected area (MPA) congress of the Provincial Government of Southern Leyte (PGSL), by Hon. Eva Abad, head of the Provincial Environment and Natural Resource Management Office (PENRMO). CCC provided a presentation on the work currently being undertaken in Southern Leyte and the importance of biophysical assessments in the implementation of MPAs, along with some tips on how to effectively manage small scale, community managed MPAs.





## SCHOLARSHIP PROGRAMME

The Scholarship Programme is a unique initiative practiced by CCC. It aims to increase capacity within the Philippines through immersive, practical training; providing stakeholders with the tools and skills to successfully manage their marine resources sustainably. It provides opportunities to national Filipino students and community members that can demonstrate a clear intent and passion for conservation, and a wish to pursue this passion further. The opportunity to attend is available to one Filipino national every month following a rigorous application process. Over a four-week period, scholars are integrated amongst international volunteers. During this period, scholars receive all of the training experienced by paying, international volunteers free-of-charge (excluding costs of personal insurance). This includes gaining a SCUBA PADI Open and Advanced Open Water certification, First Aid training through CCC's Expedition Care Programme (ECP) and CCC's Skills Development Programme (SDP).

Whilst undertaking the programme, scholars form an integral part of CCC's scientific survey team, implementing proposed MPA assessments, whilst also being introduced to CCC's coral reef rehabilitation programme through coral reef propagation and transplantation. Upon completion of the Scholarship Programme, scholars will hold certifications, knowledge and skills in coral reef ecology,

marine resource management, species identification, data collection methods and data assimilation techniques; all relevant tools to enable proactiveness within their resident community.

To date, over the past ten years, CCC has delivered over 25,000 hours of scholar training to 159 successful applicants. During 2018, CCC welcomed 9 scholars. The programme has shown great success over the years with scholars often continuing to take up roles within government agencies, conservation NGOs and even establishing their own NGOs. Furthermore, it is not uncommon for scholars to return to CCC's site to further their experience and assist with current initiatives on site.

CCC would like to congratulate all the scholars that graduated from the programme in 2018:

Kenneth See

Jorgine (Boey) Pena

Monica Abanador

Michelle Magaslang

Blaire Padayhag

Danielle Matriano

Rhodolph Nullar

Karl Pregon

Claudia Artazo

# Interview with BLAIRE PADAYHAG



Blaire joined CCC in June 2018 as one of our many scholars. Studying a course in Fisheries and Marine Science, Blaire was eager to get stuck in and was an instant hit with the staff and volunteers! We took some time to chat to Blaire after her scholarship to find out how the programme benefitted her future prospects.

## **How did you hear about the CCC Scholarship Programme and what inspired you to apply?**

I've heard about Coral Cay Conservation through friends who are also active in taking part in marine conservation. As I am also deeply interested in marine science, this inspired me to apply and get to know organisations such as Coral Cay Conservation and how such organisations give back to the immediate community.

## **What new skills have you gained during your time at CCC?**

During my stay, I've managed to 'control' my buoyancy, stared into the depths and became a more confident diver through CCC's scuba instructor (one of the most amazing SI)! Importantly, the SDP is the highlight skill that I've learned which includes identifying cool reef fishes, doing advanced hard coral ID and especially the ways of data collection, input and how these data are analysed and made sensible and relative. This definitely made the underwater world even better for me.

## **How will these new skills benefit you in your current day-to-day life and in the future?**

These new skills have provided me the fundamentals in marine ecology and the actual experience on reef surveys both of which are essential in knowing and checking the global status of our reefs and how they cascade in so many levels. As I intend to pursue a path in marine science, they would be very handy in future reef check surveys and volunteer work that I might be doing. Also, this training and experience would surely be useful in my future work/research endeavour and personal advocacy by widening my grasp in marine science and conservation.

## **What was your favourite element of the scholarship programme? e.g. dive training, SDP, surveying. Why?**

Definitely, surveying! For me, it was the final test of skills that I have acquired the entire time that I am here and that I get to finally contribute to data collection. I did find them challenging and intense as you are actually working (and thinking) while diving underwater but then after doing it for a while, it somehow became natural.

## **Aside from the diving and science elements, do you feel you have gained anything else from your CCC experience?**

Of course, yes! Aside from all the science elements, I think what stood out was the friendship that I gained with a bunch of diverse strangers (initially). I've gained a lot of life insights (in general) and has strengthened my 'passion' for conservation work and be more curious about the complexity of the underwater world and its social relevance.

Thank you CCC (from the bottom of my heart) for taking me in not just as a scholar but a part of the family as well. This is definitely one of the most well-spent 'summers', taking part in a marine conservation effort! Thank you for the untiring effort in teaching and spreading ocean conservation awareness to the local communities and to the international volunteers.

# A BIG THANK-YOU

CCC can only be successful in conserving the wondrous and critical ecosystems within the Philippines' biodiversity hotspot, through their devoted volunteer, scholar and staff network. It is only through a proactive group of conservation-minded advocates, multi-faceted collaborations, and regional capacity that current stressors can be challenged, and actions taken ensuring sustainability for future generations.

As an organisation, we cannot continue to achieve targets and aims, provide education to the future generation of the Philippines and promote best practices without your support, we would like to express our heart-felt gratitude to...

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