

**14.2.3. Batangas State University – The National Engineering University offers educational outreach activities for local or national communities to raise awareness about overfishing, illegal, unreported and unregulated fishing and destructive fishing practices.**



## INDUSTRIALIZATION AND HUMAN ACTIVITIES

Increasing industrialization, tourism activities, climate change = **DETRIMENTAL EFFECTS** to marine environment and its biodiversity



## SEAWEED-SEAGRASS ECOSYSTEM

- **HIGHER** seaweed/seagrass community **DIVERSITY** in **PRISTINE** sites
- **OPPORTUNISTIC** seaweeds (*Ulva*, *Padina*) in **NUTRIENT-RICH WATERS** with **HIGH IRRADIANCE LEVEL**

## CORAL REEF ECOSYSTEM

- **HIGHER** coral cover & diversity = **HEALTHY ECOSYSTEM** = **LOCAL REEF FISH DIVERSITY & ABUNDANCE**
- **PHASE SHIFT** from coral- to seaweed-dominated ecosystem = **REEF DEGRADATION, FISHING PRESSURE, and POLLUTION**

## GAPS

- **Limited abundance data** for seaweed/seagrass and corals
- **Lack of continuous monitoring** of the health of these ecosystems
- **Lack of extensive database** on marine resources in the VIP
- **Low and inadequate stakeholder knowledge and engagement**

## INTERVENTION

- BIODIVERSITY ASSESSMENT
- PERMANENT MONITORING SITES
- ESTABLISHMENT OF HERBARIUM AND MARINE MUSEUM
- IEC STRATEGIC PLANNING

## DELIVERABLES

- Information on the health, status, and condition of the marine environment
- Data for management plan and policy intervention i.e. commercially important marine resources
- Permanent records and holdings of marine resources in the VIP
- Brochures, modules, AVP, syllabi, and other materials

## IMPLICATIONS

- Better management and conservation of the VIP
- Sustainable utilization of marine resources
- Sustainable eco-tourism
- Possible livelihood from cultivation of marine resources with potential commercial value

## STUDY SITES



## METHODOLOGY

### OBJECTIVES

1. Assess species abundance and cover of surveyed organism on each seaweed/seagrass and coral communities between pristine and eutrophicated areas
2. Established an extensive database on marine resources in the VIP
3. Develop and implement the IEC strategic plan with regard to conservation and management of marine biodiversity within the VIP



## SUSTAINABILITY PLAN AND ECONOMIC BENEFITS

- Monitoring plan system = marine-related decision-making and policy formulation in VIP
- Scientific valuation = establishment of marine protected areas, marine eco-tourism areas and ecosystem approach to fisheries management (EAFM) plans
- Seaweed species e.g. *Halymenia*, *Portleria*, *Ulva* and invertebrates e.g. *Holothuria*, *Echinometra* with potential for commercial cultivation = livelihood for coastal communities.



**DR. JAYVEE A. SACO**  
Project Leader



**2 YEARS**  
Total Duration



# Backyard Tilapia Farming (Extension from LSPU)

Miguel Enrique Ma. A. Azcuna and Jonel M. Corral

## Objectives

The project aims to increase the disposable income of poor household families in Batangas during the post-lockdown period for COVID-19 affected areas.



## Accomplishments



Delivery of Tilapia fingerlings to cooperators.



Monitoring of tilapia from growth and feed adjustment, up to the readiness for harvest.



Tilapia was harvested from the ponds of cooperators.



Tilanggit making workshop was conducted at Balayan, Batangas.



Monitoring of hatcheries at Los Baños, Laguna and Balayan, Batangas.



Contact us:

Website: <http://vipcorals.batstate-u.edu.ph/>  
vipcorals@g.batstate-u.edu.ph



# BACKYARD TILAPIA FARMING IN BATANGAS IN RESPONSE TO THE COVID-19 PANDEMIC



## Objectives

To provide immediate fish supply to poor households in Nasugbu, Batangas and increase the household disposable income. It includes development of 20 fishponds, training 20 fish farmer-household cooperators, conduct a training workshop on backyard tilapia culture, and establish partnerships with LGUs to support tilapia farming and processing in targeted communities.

**Miguel Enrique Ma. A. Azcuna, Jonel M. Corral**

## Accomplishments



Dr. Azcuna and Dr. Corral together with the representatives of DOST-PCAARRD (Dr. Adelaida Calpe, Dr. Wilfredo Ibarra, and Dr. Cynthia Almazan) met the beneficiaries and inspected the ponds for approval.



A virtual Memorandum of Understanding (MOU) Signing was held with President Tirso Ronquillo and Chancellor Enrico Dalangin giving the welcome remarks in attendance of the beneficiaries and project staff for the details of the MOU.



Delivery of tilapia fingerlings and feeds to Melecio Bo in Lian.

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✉ [vipcorals@g.batstate-u.edu.ph](mailto:vipcorals@g.batstate-u.edu.ph)

# BIODIVERSITY OF SEaweEDS AND ASSOCIATED FLORA IN THE VERDE ISLAND, BATANGAS CITY, BATANGAS PHILIPPINES



by: Jayvee Saco and Najeen Arabelle Rula

## OBJECTIVE

This study was carried out to determine the structure and distribution of seaweeds and associated flora using the line transect-quadrat method across three periods i.e., the northeast monsoon, summer, and the southwest monsoon.

## WHAT IS VIP?

The Verde Island Passage is the world's center of the center of marine shore fish biodiversity located in the southwest of Luzon Island in the Philippines. The passage was named after an island - Verde Island, located in the middle of the passage.



## SPECIES PRESENT

### 63 MACROPHYTE SPECIES

43% GREEN SEaweEDS



35% RED SEaweEDS



43% BROWN SEaweEDS



18% SEagrASS



## ACCOMPLISHMENTS

- Results of the research project were published in the Philippine Journal of Systematic Biology with the title "Marine macrophyte composition during summer, southwest and northeast monsoons in Verde Island, Batangas City, Batangas, Philippines."
- The paper was also awarded with a publication incentive award by DOST-PCAARRD.

[https://www.researchgate.net/publication/345989613\\_Marine\\_macrophyte\\_composition\\_during\\_summer\\_southwest\\_and\\_northeast\\_monsoons\\_in\\_Verde\\_Island\\_Batangas\\_City\\_Batangas\\_Philippines](https://www.researchgate.net/publication/345989613_Marine_macrophyte_composition_during_summer_southwest_and_northeast_monsoons_in_Verde_Island_Batangas_City_Batangas_Philippines)

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University of the Philippines  
Marine Science  
Institute

Jayvee A. Saco, Luigi  
P. Villalobos,  
Kathrina Joy D. De  
Austria



# BIOLOGICAL AND ECOLOGICAL STUDIES ON ASPARAGOPSIS TAXIFORMIS FOR CULTURE TECHNOLOGY DEVELOPMENT

## OBJECTIVE:

To provide foundational information on the biology, ecology, and physiology of the underutilized and underdeveloped yet economically important red seaweed *Asparagopsis taxiformis* to support the development of its cultivation technology for large-scale biomass production.

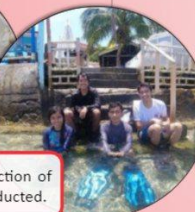
## PRELIMINARY RESULTS and ACCOMPLISHMENTS

### Accomplishments

BEAT PROJECT progress report



Preliminary fieldwork for collection of representative species was conducted.



Preliminary experiments were done (for the meantime, other representative species of the red algae were being used).



Hiring of project personnel (URA I and Laboratory technician I).

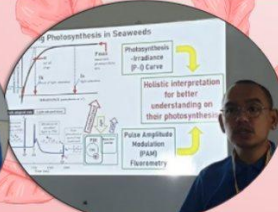
Sites were determined where *Asparagopsis taxiformis* might be found. Request for PIC were processed from possible sampling municipalities.

Purchases of materials to be used in the Y1 of the project are ongoing.

Training of project personnel was conducted.

### Accomplishments

BEAT PROJECT progress report



Percent Accomplishment: 12%

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✉ [vipcorals@g.batstate-u.edu.ph](mailto:vipcorals@g.batstate-u.edu.ph)



# Understanding Physiological Vulnerability of *Ulva* spp.: Implication to Green Tide Blooms

Jayvee A. Saco, Najeen Arabelle M. Rula,  
Jovy Ann P. Valera, Glen Brian I. Aguila



University of the Philippines  
Marine Science  
Institute

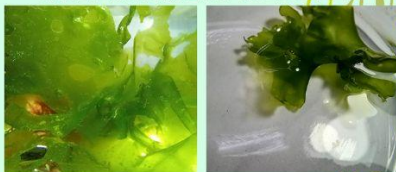
## Study Site



## Objective

To provide baseline information on aspects of the biology, ecology, and physiology of green tide bloom-forming *Ulva* species in selected coastal areas in Batangas for coastal resources management and possible cultivation.

## PRELIMINARY RESULTS



*Ulva lactuca*  
11 thalli



*Ulva reticulata*  
9 thalli

The recommended minimum duration for dark adapted state duration (DAS) in determining the  $F_v/F_m$  for both freshly collected and laboratory-grown *Ulva lactuca* samples is 10 min.

Optimizing the time duration of DAS allows for a robust measurement of  $F_v/F_m$  when conducting measurements for stress tolerance under different physicochemical parameters as well as a better understanding of the physiological conditions of *Ulva*.

## ACCOMPLISHMENTS

### Accomplishments ULVA PROJECT



(Re-Echo) Training and Discussion on Photosynthesis Measurement in Seaweeds



Preliminary Field Work



1ST Quarter Meeting of ULVA Project Staff/Personnel (UPMSI – BatStateU-VIP CORALS)

### Preliminary Experiments



### Accomplishments ULVA PROJECT

#### Preliminary Experiments:

- Optimum Time Duration for Dark Adaptive State (PAM Fluorometry)
- *Ulva* Microscopy Observations
- Brgy. Cuta West Shoreline Sampling and Herbarium Processing/Sample Preservation
- PAM Fluorometry of Fresh *Ulva* Samples
- *Ulva* Zooid Isolation, Management, and Observation

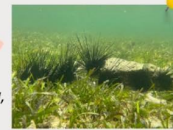
#### Inter-Agency Commitments :

- MOA with UPMSI
- PIC with Calatagan LGU
- PICs with Nasugbu & Lemery (On-Process)
- PICs with other 3 LGUs (On-Going Communications)
- Virtual Project Presentation and Meet with Calatagan MENRO

Accomplishment Rate: ~12%



# "Seaweed beds as transition habitat for coral reef fishes (SeaBaTH)"

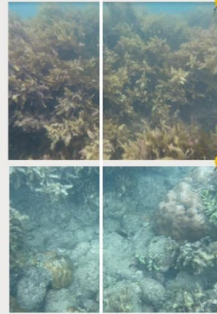


**Authors:** Jovy Ann P. Valera, Jonel M. Corral, Najeeen Arabelle M. Rula, Jayvee A. Saco, Miguel Enrique Ma. A. Azcuna, Romel U. Briones, and Renan U. Bobiles



## Rationale:

Many species of reef fish exhibit ontogenetic habitat shifts to maximize growth and survival (Dahlgren and Eggleston 2000). Seaweeds serve as three-dimensional habitat structures for many marine organisms and can serve as ecosystem engineers, altering environmental conditions and resources (Connell 2003; Smale *et al.* 2013). While the attention for protection of coral reefs and mangroves increased, the consideration for seaweed beds to be an MPA is commonly disregarded.



## The two component aims:

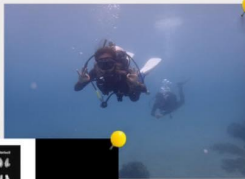
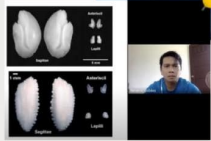
1. To investigate the relationship between seaweed species diversity and seaweed-associated reef fish diversity, identify juvenile and adult fish assemblages and determine the age of representative species of fish inferred from otolith microstructure. 🏆
2. To compare and analyze juvenile fish population from seaweed beds versus adult fish population from coral reef areas using molecular markers. 🏆

## Objective:

The main objective of the study is to investigate the possible role of seaweed beds as transition habitats for juvenile reef fish in the Verde Island Passage. The study is subdivided into two components (Seaweed and Fish Diversity and Fish Genetics).



TYPES OF OTOLITH



## Accomplishments

The project is ongoing. An otolith analysis webinar led by **Dr. Jonel Corral** from BatStateU and **Dr. Renan Bobiles** from Bicol State University was conducted last Sept. 23, 2020 to equip the team with knowledge and skills for otolith microstructure analysis.


Reconnaissance of possible sites for fieldwork was conducted last July 19-20, 2021.

*-Protecting. Saving. Conserving-*



Verde Island Passage Center for Oceanographic Research and Aquatic Life Sciences

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 [facebook.com/pg/vipcorals.batstateu](https://facebook.com/pg/vipcorals.batstateu)







# BIODIVERSITY MAPPING OF MARINE PROTECTED AREAS OF BRGY. PAPAYA, NASUGBU

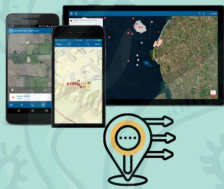
Miguel Enrique A. Azcuna, Enrique Martin Velasquez and Jonel M. Corral



## OBJECTIVES

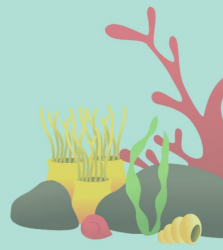
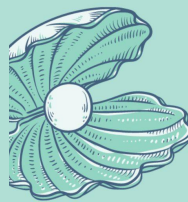
- Conduct **surveys of coral reefs** in MPAs in Barangay Papaya, Nasugbu
- Obtain **biodiversity data** in these sites and obtain specific geocoordinates.
- Process the biodiversity data and specific geocoordinates using **GIS mapping**.
- Manage and **store this information in a computer repository**.

**Baseline information on the coral communities** present in Nasugbu Marine Protected Areas is important for properly and efficiently managing **conservation and protection initiatives** in the area.



Mapping the coral reef areas using **Geospatial Image System (GIS)** and **Geo-tagging technologies** could determine the high **biodiversity in the MPAs of Nasugbu**.

**The project's biodiversity data will be digitally stored in an online database that will be open to the public.** Monitoring can be conducted to record the changes in the coral communities. This research will be an **accurate assessment of the marine resources** in Papaya, Nasugbu, as well as this data.





## UPSCALING THE SEA CUCUMBER AQUAFARMING SUSTAINABILITY: PHASE 1: OPTIMIZATION OF SEA CUCUMBER AQUACULTURE AND POST-HARVEST PROCESSING METHODS

Dr. Miguel Enrique Ma. A. Azcuna  
Dr. Jonel M. Corral  
Jovy Ann P. Valera

### Why upscale the sea cucumber aquafarming sustainability?

- The farming of sea cucumbers (Holothuridae) has developed into a commercially important sector of the aquaculture industry in the last decades. An increasing demand for high-quality sea cucumber products has resulted in a decline of wild stock populations. In response to this, aquaculture of these organisms in coastal or land-based set-ups was established to sustain consumer demand.
- Another reason is that the sea cucumber farming in Calatagan, Batangas is the verge of being depleted due to high demand; this project aims to revive cucumber farming and also introduces sea cucumbers in the potential market.



### ABOUT THE STUDY



#### OBJECTIVES

The objective of this study is to identify the diet formulation that promotes the fastest growth for sea cucumbers and establish a grow-out system for sea cucumber aquaculture from larvae to juvenile to adult stages. It also aims to establish a post-harvest processing method that can produce high quality dried sea cucumber products.

#### ACCOMPLISHMENTS

The project is deferred from February 2021 to December 2021. The equipment were procured last January 2021. The request letter for extension is submitted to Research Office for approval

#### SOCIOECONOMIC

The project includes interviewing sea cucumber farmers in Calatagan, Batangas about the challenges and difficulties they faced in producing quality sea cucumbers as well as maintaining the production rate of the harvest in the area.

#### LINK SOURCES

<http://vipcorals.batstate-u.edu.ph/upscaling-the-sea-cucumber-aquafarming-sustainability-phase-1-optimization-of-sea-cucumber-aquaculture-and-post-harvest-processing-methods/>  
<https://www.nationalgeographic.com/animals/invertebrates/facts/sea-cucumbers>



### WHAT ARE SEA CUCUMBERS?

#### ECHINODERMS

just like starfishes and sea urchins!

#### OMNIVOROUS

feeds on plants & animals

#### SOFT-BODIED CUCUMBERS

shape like cucumbers and are soft

#### SEXUAL & ASEQUAL

mostly sexual reproduction & external fertilization

#### LIVES IN SEAGRASS BEDS

usually found inhabiting sea grass beds

#### EXAMPLES



*Holothuria scabra*     *Apostichopus japonicus*

#### PRODUCTS





# SURVEY OF VULNERABLE, THREATENED, ENDANGERED, AND ECONOMICALLY IMPORTANT MARINE ORGANISMS IN VERDE ISLAND, BATANGAS CITY



Joshua Vacarizas, Jayvee Saco, Romel Briones, Najeen Arabelle Rula, Jovy Ann Valera, Emilia Andrea Sabban, Miguel Enrique Ma. Azcuna



## SPECIES

### OBJECTIVE

This study aimed to survey the different ecosystems of Isla Verde and determine the conservation status of each identified species in terms.

### Results and Discussion

- Phytoplankton Composition
  - Species known to form harmful algal blooms were found in the waters of Verde Island
  - A toxic dinoflagellate *Prorocentrum* sp. (Fig. 3) was also found as an epiphyte of *Padina* sp. from Verde Island



Fig. 3. Photomicrographs of possible harmful algal blooms forming phytoplankton found in Verde Island, Batangas City.

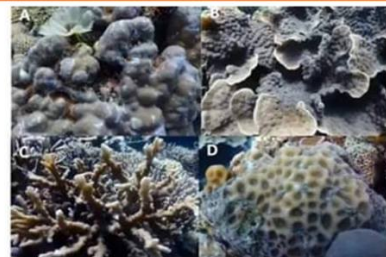


Fig. 8. Underwater photographs of *Porites* sp. (A), *Echinopora* sp. foliose form (B), *Echinopora* branching form (C), and *Favites* sp. (D), which are some of the most abundant coral genera in Verde Island, Batangas City.



- Fish Composition
  - Families with the highest number of species also have the highest number of individuals collected

Figure 9. Photographs of representative fish species belonging to families with the highest number of species and individuals recorded in Verde Island, Batangas City: Chaetodontidae (butterflyfishes) (A), Pomacentridae (damselfishes) (B), and Labridae (wrasses) (C).

### ACCOMPLISHMENTS

- Results of the project were presented on the 33rd Regional Symposium on Research, Development and Extension under the title "Marine Shore Biodiversity of Verde Island: Preliminary Assessment at the Heart of the World's Center of the Center of Marine Shore Fish Biodiversity". It was awarded 2nd place in the Research Category.

**Research Category 2<sup>nd</sup> Place**  
 Marine Shore Biodiversity of Verde Island:  
 Preliminary Assessment at the Heart of the  
 World's Center of the Center of Marine Shore Fish  
 Biodiversity

Joshua Vacarizas, Jayvee Ablara Saco,  
 Najeen Arabelle Rula, Jovy Ann Patricio Valera,  
 Emilia Andrea Sabban, Romel Briones, Miguel Azcuna\*  
 Batangas State University



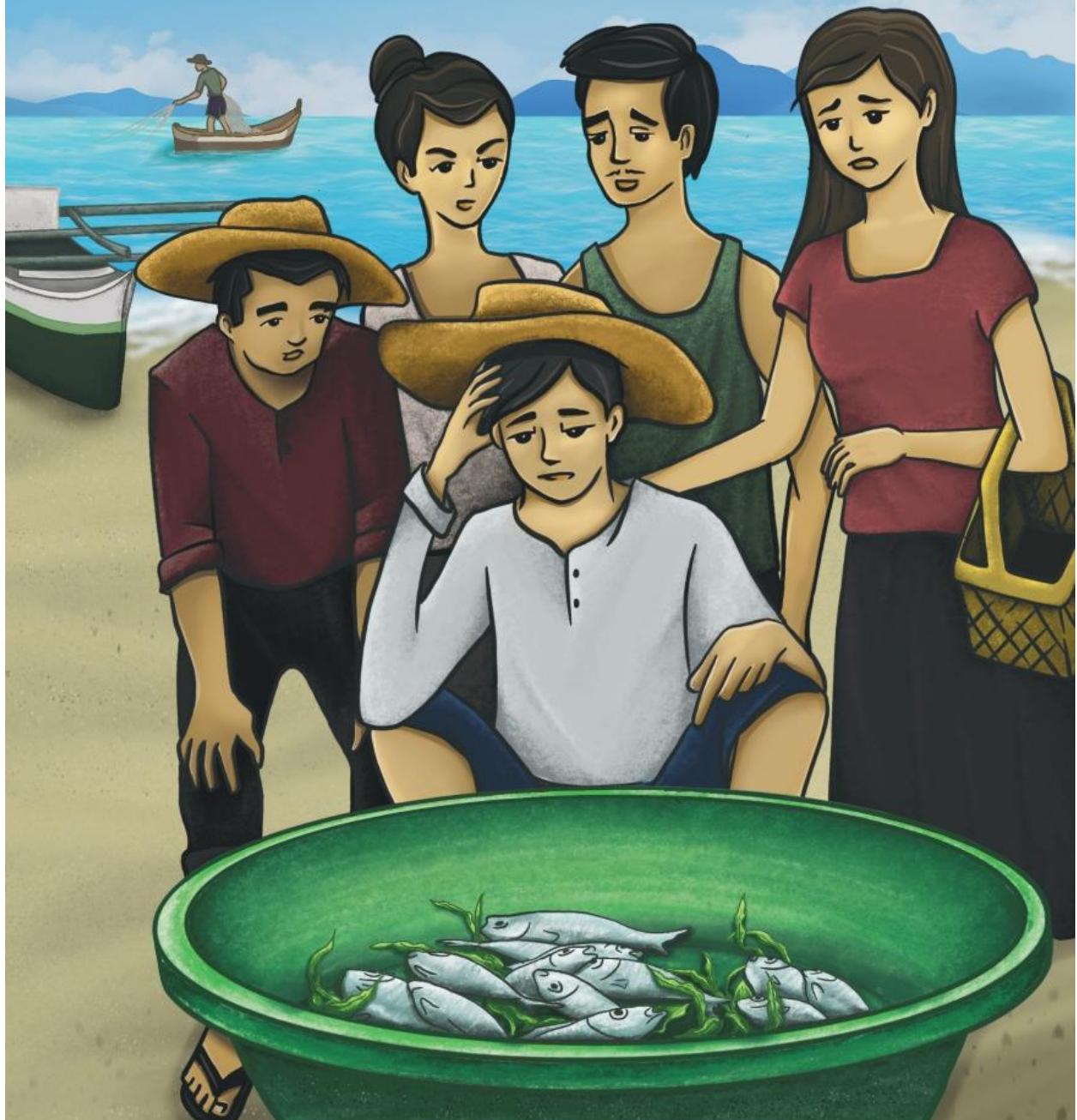
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[vipcorals@g.batstate-u.edu.ph](mailto:vipcorals@g.batstate-u.edu.ph)

# Bakit kakaunti ang huli ni Romel?

Kuwento ni Vaberlie P. Mandane-Garcia

Guhit ni May L. Delgado





## Ang mga Researchers



**JAYVEE ABLAÑA SACO, PhD**  
Project Leader, MBioAssess-VIP Project  
Center Head, VIP CORALS

**MIGUEL ENRIQUE MA. A. AZCUNA, PhD**  
Project Staff for Coral Ecosystem

**NAJEEN ARABELLE M. RULA, MSc**  
Project Staff for Seaweed/Seagrass  
Ecosystem

**ENRIQUO MARTIN C. VELASQUEZ, MSc**  
URA for Coral Ecosystem

**KHAY ANN J. RAMOS-DANILA**  
URA for Seaweed/Seagrass Ecosystem

**JONEL M. CORRAL, PhD**  
Support Staff

**JOVY ANN P. VALERA, MSc**  
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**ALECS L. PERSIA**  
Project Assistant

**JOHN MATTHEW H. ARCEGA**  
Science Aide I

**RED A. TARCELO**  
Project Assistant/Graphic Artist

**JADE SYMON A. BINAY**  
Science Aide I

Sinas

# DINO at LARA at ang mga BUHAY sa DAGAT



Verde Island Passage  
Center for Oceanographic Research  
and Aquatic Life Sciences



Batangas State University  
The National Engineering University



Social Innovation Research Center



Philippine Council for Agriculture,  
Aquatic, and Natural Resources  
Research and Development



Department of Science and Technology



**ABS-CBN**  
**BANTAY KALIKASAN**

In the Service of the Filipino

October 20, 2022

**DR. TIRSO A. RONQUILLO**  
University President  
Batangas State University  
Rizal Ave., Batangas City 4200  
Batangas, Philippines

**Attention:** Dr. Miguel Enrique Ma. M. Azcuna  
Center Head, Verde Island Passage Center for Oceanographic Research and Aquatic Life Sciences (VIP  
CORALS) - Nasugbu

Dear Dr. Ronquillo,

Greetings!

This is to inform you that ABS-CBN Lingkod Kapamilya Foundation, Inc. through its Bantay Kalikasan and SEA Institute Programs will be conducting the second round of **Alwan Reef Monitoring Workshop and Surveys in Lobo, Batangas from October 24-27, 2022.**

In this regard, we are formally inviting the following scientists of the Batangas State University VIP Center for Oceanographic Research and Aquatic Life Sciences (BatStateU VIP Corals) to join the survey as trainers and team scientists.

1. Dr. Miguel Azcuna
2. Dr. Jonel Corral
3. Mr. Enrique Velasquez

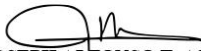
The workshop will be conducted in Barangay Biga and the surveys in the reef and sanctuary areas of Barangays Soloc and Malabrigo. There will be a maximum of five (5) participants from Barangay Biga for the training workshop and there will be a maximum of fifteen (15) from the Bantay Dagat and the member organizations of the Lobo Marine Environment Conservation Foundation (LMECF) participating in the coral reef monitoring activities.

This project is funded by Sagip Kapamilya and First Gen Corporation as a component of the Lopez Group of Companies' Ridge to Reef Regeneration Project. The reef monitoring survey enables the Bantay Dagat and LMECF volunteers to detect early signs of problems to the health of coral reefs in the target areas.

This is a continuation of the collaboration among BatStateU, DLSU, the Lobo LGU, Lobo communities, and the Lopez Group of Companies to establish a network of Citizen Scientists in Batangas and a key step to preserve the marine biodiversity of the Verde Island Passage.

Thank you very much and we look forward to your positive reply.

Sincerely yours,



**JOSEPH ALFONSO T. ASCALON**  
Program Head, Bantay Kalikasan  
Executive Director, SEA Institute – VIP  
[JTAscalon@abs-cbnfoundation.com](mailto:JTAscalon@abs-cbnfoundation.com)



In the Service of the Filipino

December 15, 2022

**TO: DR. MIGUEL AZCUNA**  
Verde Island Passage Center for Oceanographic Research and Aquatic Life Sciences  
Batangas State University

Dear Sir,

Greetings from the ABS-CBN Foundation!

The ABS-CBN Foundation, Inc. (AFI) would like to invite you to an in-person visioning session for the ongoing **“Community Resilience through Citizen Science - Coral Reef Scorecards and Reporting”** project under the Gerry Roxas Foundation – INSPIRE. The focus of this visioning session is to delineate the roles and responsibilities of the GRF-INSPIRE partners and staff. The attendees of this session will be the major academic partners of the Foundation for this project.

This visioning session will take place in the EJM Building, Mother Ignacia Ave., Quezon City on **Wednesday, December 7, 2022**, from 9am-12pm. Snacks and lunch will be served for all attendees.

We look forward to your positive response.

Sincerely,

A handwritten signature in black ink, appearing to read 'Joseph Ascalon', written over a horizontal line.

**JOSEPH ALFONSO T. ASCALON**

Program Head, Bantay Kalikasan  
ABS-CBN Foundation, Inc.