The 26th Philippine Biodiversity Symposium

# New and Emerging Trends in Biodiversity Research and Conservation

Biodiversity Conservation Society of the Philippines

ATENEO DE MANILA UNIVERSITY

ATENEO DE MANILA UNIVERSITY DEPARTMENT OF BIOLOGY EST. 1963

18-22 July 2017

Ateneo de Manila University,
Katipunan Avenue, Loyola Heights, Quezon City

# Message

ATENEO

**BIODIVERSITY RESEARCH AND CONSERVATION WORK** is more important now than ever, given the exponential changes we are witnessing at unprecedented magnitude and scale. Species, some seen as crucial for our own survival, are now in danger of extinction. This can be all so rather depressing and paralyzing. It is thus reassuring that groups such as the Biodiversity Conservation Society of the Philippines (BCSP) have been working hard in their mission not only to protect but also to discover the breathtaking spread of flora and fauna in the country.

The work of the BCSP is timely as the world comes to learn about our country as a vital center of biodiversity. Just this month, new species were discovered by a team from the California Academy of Sciences studying the Verde Island Passage, which has been called the most biologically diverse marine ecosystem on Earth. In some sense, biodiversity is always beginning because it is always unfolding. It would be tragic indeed if our myopic ways these days were to subvert this biodynamism.

It is heartening to note how our beloved Pope Francis dedicates an entire section of his encyclical Laudato Si to biodiversity. As he writes: "Greater investment needs to be made in research aimed at understanding more fully the functioning of ecosystems and adequately analyzing the different variables associated with any significant modification of the environment. Because all creatures are connected, each must be cherished with love and respect, for all of us as living creatures are dependent on one another." (Laudato Si, num 42)

On behalf of the Ateneo de Manila, I welcome you all to this gathering. We consider it a privilege to host this symposium. And we wish you a vibrant connection of people and insights and practicable measures that will truly empower us to protect and care for the world, our common home.

**JOSE RAMON T. VILLARIN, SJ**
*President*
Ateneo de Manila University

# Message

Biodiversity Conservation Society of the Philippines

WE PRIDE OURSELVES FOR THE MANY SPECIES DISCOVERED in the Philippines every year. But with new discoveries, new threats and issues likewise arise: new species sometimes meant watching for poachers on the prowl, or a taxonomic split entails redesigning conservation plans and priority conservation areas.

The theme of the 26th Annual Philippine Biodiversity Symposium, New and Emerging Trends in Biodiversity Research and Conservation, is befitting of this day and age as we come to the conclusion that conservation threats – be it climate change, illegal wildlife trade, changing land use, and invasive alien species, among others – and the factors that increase these threats become more sophisticated. Researchers and conservation practitioners must learn to identify new issues and emerging trends on Philippine biodiversity even before they become evident and difficult to manage. We must become adaptable to shifting policies, evolving research priorities and management strategies that we learn from the field. And in doing so, we must be innovative and advanced in our approach to studying and conserving our species and ecosystems.

In this year's symposium, we bring you an outstanding program that will highlight not only the issues, but also the technologies, conservation breakthroughs, and renewed plans and policies that will aid us researchers and conservation practitioners in becoming more efficient in our work and advocacies.

I thank the Department of Biology of the Ateneo de Manila University for graciously hosting this year's symposium. Likewise, our sincerest thanks to the sponsors, partner institutions, volunteers, and presenters for contributing their time to the advancement of biodiversity research and conservation in the Philippines.

I look forward to welcoming you at the 26th Annual Philippine Biodiversity Symposium!

**CYNTHIA ADELINE LAYUSA-OLIVEROS**
*President*
Biodiversity Conservation Society o

In memory of

Danilo S. Balete

1960 – 2017

Biodiversity Conservation Society of the Philippines

ATENEO DE MANILA UNIVERSITY

DEPARTMENT OF BIOLOGY

# The 26th Annual Philippine Biodiversity Symposium

## New and Emerging Trends in Biodiversity Research and Conservation

Ateneo de Manila University, Katipunan Avenue, Quezon City
18-22 July 2017

## 18 July 2017 (Tuesday)

| | |
|---|---|
| 09:00<br>*Leong Hall Lobby* | Registration opens<br>Poster and exhibit ingress |
| 13:30 –16:00<br>*Leong Hall* | ***OPENING PROGRAM***<br>*Master of Ceremonies:* Juan Carlos T. Gonzalez, Natural History Museum, University of the Philippines Los Baños<br>**National anthem**<br>**Invocation**<br>Adria Rae Abigail Eda, Ateneo de Manila University<br>**Welcome remarks**<br>Evangeline Bautista, Acting Vice President, and Dean, School of Science and Engineering, Ateneo de Manila University<br>**Opening remarks**<br>Cynthia Adeline A. Layusa-Oliveros, President, Biodiversity Conservation Society of the Philippines (BCSP)<br>**Message**<br>Mundita S. Lim, Director, Biodiversity Management Bureau<br>**Inspirational messages and sharing of experiences from the Whitley Fund for Nature Awardees**<br>Marites Gatan-Balbas, Mabuwaya Foundation, Inc.<br>Jayson I. Ibañez, Philippine Eagle Foundation, Inc.<br>Indira Lacerna-Widmann, Katala Foundation, Inc. |
| 16:00 – 16:30<br>*Leong Hall* | Group photo and break |
| 16:30<br>*SEC A Foyer* | Opening of institutional exhibits |
| 18:30<br>*Leong Hall Roof Deck* | ***WELCOME DINNER***<br>sponsored by the Ateneo de Manila University<br>Ateneo de Manila University Press presentations |

# Program

## 19 July 2017 (Wednesday)

| | |
|---|---|
| 07:00 – 08:00<br>*Leong Hall Lobby* | Attendance and registration |
| 08:00 – 10:00<br>*Leong Hall* | ***PLENARY PRESENTATIONS***<br>*Facilitator:* Leticia E. Afuang, University of the Philippines Los Baños |
| 08:00 | Announcements |
| 08:05 | **The Biodiversity Conservation Society of the Philippines** |
| 08:20 | Plenary Talk 1:<br>**Conservation of Philippine bats — insights offered from a global perspective**<br>David L. Waldien, Christopher Newport University |
| 09:00 | Plenary Talk 2:<br>**Wildlife forensics at the forefront of protecting Philippine biodiversity**<br>Ian Kendrich C. Fontanilla, Institute of Biology, College of Science, University of the Philippines, Diliman, Quezon City and Philippine Genome Center, University of the Philippines System |
| 09:40 | Open forum |
| 10:00 – 10:30<br>*SEC A, B, C Foyer* | Coffee break and exhibit viewing |
| 10:30 –12:00<br>*Escaler Hall* | **The Updated Philippine Red List of Wild Fauna: presentation and constituency consultation** |
| 12:00 – 13:30<br>*Leong Hall Roof Deck* | Lunch |
| 13:30 – 17:00<br>*Leong Hall* | ***PARTNERS' PRESENTATIONS AND SCIENTIFIC POSTER SESSION***<br>*Moderators:* Rainier I. Manalo, Crocodylus Porosus Philippines, Inc.<br>Mae Lowe L. Diesmos, University of Sto. Tomas |
| 13:30 | **Financing the Philippine Biodiversity Strategy and Action Plan**<br>Anabelle Plantilla, United Nations Development Programme |
| 13:45 | **Wildlife trade findings: suspicious captive animal management and other dodgy doings**<br>Serene Chng, TRAFFIC Southeast Asia |
| 14:00 | **WildTech: bringing technology into the wildlife conservation battlefield**<br>Edmund Leo B. Rico, Center for Conservation Innovations |
| 14:15 | Mechanics of the Pecha Kucha for poster presenters |
| 14:30 | **PECHA KUCHA** |
| 16:00<br>*SEC B and C Foyer* | Poster session: exhibits and poster viewing |

# Program

## 20 July 2017 (Thursday)

| | |
|---|---|
| 07:00 – 08:00<br>*Leong Hall Lobby* | Attendance and Registration |
| 08:00 – 10:00<br>*Leong Hall* | ***PLENARY PRESENTATIONS***<br>*Facilitator:* Crisanto M. Lopez, Ateneo de Manila University |
| 08:00 | Announcements |
| 08:05 | **The Foundation for the Philippine Environment (FPE)** |
| 08:20 | Plenary Talk 1:<br>**Using drones as a biodiversity research and conservation tool in the Philippines**<br>Merlijn van Weerd, Mabuwaya Foundation, Inc. |
| 09:00 | Plenary Talk 2:<br>**Remote sensing in support of biodiversity studies: opportunities and challenges**<br>Ariel Blanco, UP Training Center for Applied Geodesy and Photogrammetry and Department of Geodetic Engineering, College of Engineering, University of the Philippines Diliman |
| 09:40 | Open Forum |
| 10:00 – 10:30<br>*SEC B and C Foyer* | Coffee Break and Exhibit Viewing |

***CONCURRENT SCIENTIFIC ORAL PRESENTATIONS: SESSIONS 1–2***

| | *SEC B 201* | *SEC C 201* |
|---|---|---|
| | **Session 1: Biogeography and distribution**<br>*Moderator:* Juan Carlos T. Gonzalez, UP Los Baños | **Session 2: Wildlife biology and ecology**<br>*Moderator:* Desamarie Antonette P. Fernandez, UP Los Baños |
| 10:30 – 10:45 | **Evidences of a wider biogeographical distribution of the minute-marsh loving beetle Genus *Caccothryptus* SHARP (Coleoptera: Limnichidae: Limnichinae) in the Philippines**<br>Emmanuel D. Delocado | **Population density of long-tailed macaques (*Macaca fascicularis*) in Puerto Princesa Subterranean River National Park, Palawan, Philippines**<br>Geneva Carla S. Chavez |
| 10:45 – 11:00 | **Distribution and diversity patterns of herpetofauna in Pantabangan-Carranglan Watershed, Nueva Ecija, Caraballo Mountain Range**<br>Paul Henric Gojo Cruz | **Population status and habitat requirements of the threatened visayan hornbills in Central Panay Mountains, Panay Island**<br>Al Christian D. Quidet |
| 11:00 – 11:15 | **GIS-based suitability analysis of possible nesting sites of the *Pithecophaga jefferyi* (Philippine Eagle) at Mt. Apo forests**<br>Harriet Elaine Limpot | **Emergence behavior of a multi-species assemblage of bats in a cave on Mt. Makiling Forest Reserve, Philippines**<br>Frex D. Dimaculangan |

# Program

| | | |
|---|---|---|
| 11:15 – 11:30 | **Ectoparasite diversity and rates of reinfestation in a roost of *Scotophilus kuhlii* (Chiroptera: Vespertilionidae) from the National Crop Protection Center (NCPC), Los Baños, Philippines**<br>Daniel Dave Bernaldez | **Rapid assessment of dugong (*Dugong dugon*) population and habitats in Hinatuan Bay, Surigao del Sur**<br>Reynante V. Ramilo |
| 11:30 – 11:45 | **Molecular phylogeny and biogeographic distribution of pheretimoid earthworms (Clitellata: Megascolecidae) of the Philippine archipelago**<br>Nonillon M. Aspe | **Pair-wise comparison of species richness, diversity, and assemblage of fruit bats in secondary forests and reforestation areas in the Philippines**<br>Mariano Roy M. Duya |
| 11:45 – 12:00 | Open forum | Open forum |
| 12:00 – 13:30 | Lunch | |
| | ***CONCURRENT SCIENTIFIC ORAL PRESENTATIONS: SESSIONS 3–4*** | |
| | *SEC B 201* | *SEC C 201* |
| | **Session 3: Taxonomy and systematics**<br>*Moderator:* Hendrik Freitag, Ateneo de Manila University | **Session 4: Biodiversity and conservation threats and issues**<br>*Moderator:* Zomesh Maini, Ateneo de Manila University |
| 13:30 – 13:45 | ***Aretidris*, a new genus of ants (Hymenoptera: Formicidae) from the mountains of Luzon**<br>David Emmanuel M. General | **Alien amphibians, a threat to Philippine biosecurity: Developing a National Invasive Alien Amphibian Species Watch List**<br>Arman N. Pili |
| 13:45 – 14:00 | **Review of the taxonomic status and distribution of genus *Caenis* Stephens (Insecta, Ephemeroptera, Caenidae) in the Philippines**<br>Jhoana Garces | **Utilization of Facebook to trade live reptiles in the Philippines**<br>Emerson Y. Sy |
| 14:00 – 14:15 | **Review of the aquatic riffle beetle genus *Graphelmis*, DELÈVE, 1968 (Insecta: Coleoptera: Elmidae) in the Philippines**<br>Ninez Bernardine L. Manaloto | **Change detection of mangrove coverage in Masinloc and Palauig, Zambales from 1995, 2005, and 2015 using remotely-sensed imagery**<br>Victoria Aubrey C. Manalo |
| 14:15 – 14:30 | **Phylogenetic study of the caddisfly Subfamily Macronematinae (Trichoptera: Hydropsychidae)**<br>Christine Jewel C. Uy | **Assessing the vulnerability to climate change of some of the Philippines' endemic mammals**<br>Josefa Isabel Tauli |

# Program

| | | |
|---|---|---|
| 14:30 – 14:45 | **Ultraconserved elements clarify the phylogenetic position of Philippine Zosteropids**<br>Carl H. Oliveros | **Effects of urbanization on biodiversity: a comparison of stream benthic macroinvertebrates in the Upper Marikina River Basin Protected Landscape and other sites in the Marikina Watershed**<br>Alexis E. Belen |
| 14:45 – 15:00 | Open forum | Open forum |
| 15:00 – 15:30<br>*SEC A, B, C Foyer* | Break | |
| 15:30 - 18:30 | ***BCSP GENERAL ASSEMBLY***<br>Alternative for non-BCSP members: **Campus Sustainability Tour** | |
| 18:30<br>*Leong Hall Roof Deck* | ***FELLOWSHIP DINNER* and Program featuring the Semi-circle of Life**<br>**Tribute to Danilo S. Balete**<br>**Induction of New Members** | |

## 21 July 2017 (Friday)

| | |
|---|---|
| 07:00 – 08:00<br>*Leong Hall Lobby* | Attendance and Registration |
| 08:00 – 10:00<br>*Leong Hall* | ***PLENARY PRESENTATIONS***<br>*Facilitator:* Myrissa Lepiten-Tabao, Biodiversity Conservation Society of the Philippines |
| 08:00 | Announcements |
| 08:05 | **Roots.Asia** |
| 08:20 | **Team Energy Foundation, Inc. (TEFI)** |
| | Plenary Session: **The Convention on Migratory Species (CMS)** |
| 08:30 | **Significance of the Philippines in the conservation of migratory birds** |
| 08:55 | **The conservation of migratory sharks and other marine wildlife**<br>Moonyeen Nida R. Alava, Coastal Conservation and Education Foundation, Inc. |
| 09:20 | **Global action towards the conservation of migratory species**<br>Biodiversity Management Bureau |
| 09:45 | Open forum |

# Program

| | | |
|---|---|---|
| 10:00 – 10:30<br>*SEC B and C Foyer* | Coffee Break and Exhibit Viewing | |
| | ***CONCURRENT SCIENTIFIC ORAL PRESENTATIONS: SESSIONS 5–6*** | |
| | *SEC B 201* | *SEC C 201* |
| | **Session 5: Biodiversity conservation, management and governance**<br>*Moderator:* Jhoana Garces, Ateneo de Manila University | **Session 6: Wildlife biology and ecology**<br>*Moderator:* Ninez Bernardine L. Manaloto, Ateneo de Manila University |
| 10:30 – 10:45 | **Geospatial analysis for integrating conservation and development-related land uses in Philippine landscapes**<br>Trina Isorena | **Understanding prey-predator relationship using clay models**<br>Bonifacio O. Pasion |
| 10:45 – 11:00 | **Knowledge integration and conservation: The case for indigenous *Bagobo* Villages at Mt. Apo, Davao City**<br>Jayson C. Ibanez | **Role of sensory cues in fruit selection of *Ptenochirus jagori* (Chiroptera: Pteropodidae) in captive conditions**<br>Elyzza Marie A. Toledo |
| 11:00 – 11:15 | **Calamian deer *Axis calamianensis* conservation in Busuanga Island, Palawan**<br>Joshuael C. Nuñez | **Development of a Flora Index for forest health assessment in five geothermal production fields**<br>David Justin R. Ples |
| 11:15 – 11:30 | **The SEABIO Consortium for Biodiversity Research and the latest results from Thailand, Cambodia, Indonesia, and the Philippines**<br>Hendrik Freitag | **What drives palm community structure and diversity on Samar Island, Philippines?**<br>Jiro T. Adorador |
| 11:30 – 11:45 | **River sediment analysis: basis for rehabilitation of Buayan-Malungon River Basin**<br>Merry Chrisse C. Kamad | **Effects of temperature variations on the clutch size and prosome length of *Arctodiaptomus dorsalis* (Marsh, 1905) from a cluster of seven maar lakes found in Luzon Is. (Philippines)**<br>Sean Hirshel Cusi |
| 11:45 – 12:00 | Open forum | Open forum |
| 12:00 – 13:30<br>*Leong Hall Roof Deck* | Lunch | |

# Program

| | | |
|---|---|---|
| | ***CONCURRENT SCIENTIFIC ORAL PRESENTATIONS: SESSIONS 7–8*** | |
| | *SEC B 201* | *SEC C 201* |
| | **Session 7: Biodiversity conservation, management and governance**<br>*Moderator:* Willem van de Ven, Biodiversity Conservation Society of the Philippines | **Session 6: Wildlife biology and ecology**<br>*Moderator:* Nikki Dyanne C. Realubit, Biodiversity Conservation Society of the Philippines |
| 13:30 – 13:45 | **Addressing gaps in wildlife law enforcement using enforcement analysis tools**<br>Glenn M. Forbes | **Bioacoustics analysis in Philippine hornbills**<br>Shari L. Guerra |
| 13:45 – 14:00 | **People and crocodiles sharing one environment: a review on local human-crocodile conflict management strategies in the Philippines**<br>Meljory D. Corvera | **Understory and sub-canopy to canopy vertebrate fauna in the Mt. Makiling Forest Reserve, Los Baños, Laguna**<br>Anna Pauline O. de Guia |
| 14:00 – 14:15 | **A model to establish and sustain community conserved areas**<br>Merlijn van Weerd | **A Chiropteran Integrity Index of terrestrial ecosystem health in five geothermal reservations in the Philippines**<br>Jay S. Fidelino |
| 14:15 – 14:30 | **The continuing challenge of crocodiles in the utilitarian perspective of Philippine politics**<br>Jazztin Jairum P. Manalo | **Migratory raptor study in Barangay Rio del Pilar, Glan, Sarangani Province**<br>Joylyn R. Dayondon |
| 14:30 – 14:45 | Open forum | Open forum |
| 14:45<br>*SEC A, B, C Foyer* | Break and assembly for concurrent workshops | |
| 15:00 – 18:30 | ***CONCURRENT WORKSHOP SESSIONS*** | |
| *CTC 102* | Generating stakeholders' support for sea turtle conservation: From diet to conservation: The case of biodiversity conservation in Puerto Princesa's northeast area and its attached interconnected ecosystems | |
| *CTC 104* | Forest and coastal resources information extraction from LiDAR | |
| *CTC 105* | Conservation fundraising: lessons learned | |
| *CTC 106* | Workshop for developing standardized tools for urban biodiversity assessment | |
| *SEC B305* | Freshwater arthropods: state of knowledge in the Philippines and priorities for future research and conservation (a hands-on workshop) | |
| *CTC 107* | Consultation workshop for the Flying Fox Conservation Action Plan | |

# Program

| | |
|---|---|
| 18:30<br>*Leong Hall Roof Deck* | ***CLOSING DINNER***<br>sponsored by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)<br><br>**Awarding ceremonies**<br><br>**Message**<br>Antonio C. Manila, Assistant Director, Biodiversity Management Bureau<br><br>**Closing Remarks**, Jose Ramon T. Villarin, SJ, President, Ateneo de Manila University |

## 22 July 2017 (Saturday)

| | |
|---|---|
| 08:00 | ***OPTIONAL FIELD TRIP***<br>Masungi Georeserve (limited slots only)<br>Walking tour of Manila |

## List of Titles
# Plenary Presentations

# Plenary Presentation

## Conservation of Philippine bats — insights offered from a global perspective

**David L. Waldien, Ph. D.***

The Philippines is a mega-diverse country and is home to more than 79 species of bats — experts predict the list may near 100 species. Timely and effective conservation and management of bats and their habitats in the Philippines is critical given the importance of bats to healthy ecosystems through pollination, seed dispersal, and insect predation. The Biodiversity Conservation Society of the Philippines is uniquely positioned to catalyze effective and sustainable conservation through undertaking quality research to inform conservation actions and to generate public awareness and support. I will share personal insights and lessons learned from collaborative initiatives in the Philippines, and around the world, emphasizing the importance of: 1) undertaking quality research to answer priority questions; 2) training and mentoring the next generation (and ourselves); 3) establishing trusted partnerships to build a foundation for sustainability; 4) mobilizing the public, private, and government sectors to achieve meaningful conservation; and 5) always maintaining your self-reliance even as you proactively work with others. While the conservation challenges we face are great, I believe we can and will make significant progress by working together.

* Christopher Newport University, Newport News, Virginia, USA

# Plenary Presentation

## Wildlife forensics at the forefront of protecting Philippine biodiversity

**Ian Kendrich C. Fontanilla**[1,2], Adrian U. Luczon[1], John Gregor A. Roño[1], Mariano Roy M. Duya[1], Perry S. Ong[1]

As a major biodiversity hotspot, the Philippines is home to many endemic and endangered species. However, illegal wildlife trade impacts on the conservation of these species. Enabling mechanisms in the Philippines to protect these species include the country being a signatory to the Convention on International Trade in Endangered Species (CITES), which ensures these species are not over-exploited, and the Wildlife Resources Conservation and Protection Act (Republic Act 9147), which prohibits the trade of endangered species. Our law enforcement agents, however, are hampered in their ability to identify confiscated specimens due to limitations of morphological identification. To address this problem, the Department of Environment and Natural Resources-Biodiversity Management Bureau formed a partnership with the Institute of Biology, University of the Philippines Diliman in order to utilize wildlife forensics, particularly DNA barcoding, for rapid and accurate identification of unknown individuals to their correct species designation. DNA barcoding uses specific gene segments that are used as markers; these segments are sequenced from unknown individuals, which are then compared to known reference sequences in a database. For DNA barcoding to be useful in the Philippine setting, however, it must satisfy the following elements: (1) the markers used are variable enough for inter-species delineation for specific taxonomic groups; (2) the taxa in question are comprehensively represented in the database; and (3) law enforcement agents are trained in the proper protocol in collecting and handling biological samples. The current state of the Philippines based on these elements are reported here.

* *Ian Fontanilla* is a molecular phylogeneticist at the Institute of Biology, University of the Philippines Diliman. He obtained his PhD at the University of Nottingham, UK and his BS Biology and MS Biology (Genetics) at the University of the Philippines Diliman. He is currently the head of the DNA Barcoding Laboratory at the Institute of Biology and the Program Director for Biodiversity at the Philippine Genome Center.

[1] Institute of Biology, College of Science, University of the Philippines Diliman, Quezon City

[2] Philippine Genome Center, University of the Philippines System

# Plenary Presentation

## Using drones as a biodiversity research and conservation tool in the Philippines

**Merlijn van Weerd***

Drones (unmanned aerial vehicles) have become increasingly affordable and useful for biodiversity research and conservation activities. Drones can be used to survey areas that are difficult to reach such as marshes and forest canopies. They can also be used to survey species that would otherwise be disturbed by human presence. Drones can be used to inspect nests or observe and document behavior of wildlife species. Drones can be used to film wildlife and ecosystems in high quality for use in educational and awareness raising materials. Drones can also be used to monitor and document changes in ecosystems caused by logging and agricultural encroachment and drones are increasingly used by environmental law enforcers to monitor illegal activities or collect evidence. Drone-generated images are very useful in land use planning and can also be used to monitor and document the impact of natural disasters on ecosystems. Drawbacks of drones are the high cost of purchase, the risk of accidents, the risk of loss of the drone, the short battery life, the short range and the limitations of cameras but the drone industry is rapidly developing new improved models that are safer and better. Several drone models are available in the Philippines. Government regulations are also developing to limit the risk of drone-related accidents and potential infringements of privacy. The Mabuwaya Foundation has been using a drone for two years and during this presentation video clips will be shown to illustrate the diverse possibilities of a drone as a research and conservation tool. We will discuss our experiences with the drone and we will provide a short overview of Philippine official regulations regarding drones and tips for those who want to purchase a drone for research or conservation activities.

**Merlijn van Weerd* is a Dutch biologist working in the Philippines since 1999. He co-founded the Isabela Province-based Mabuwaya Foundation in 2003 and is director of this conservation organization while also being connected to Leiden University in the Netherlands. Mabuwaya started as a research and conservation program for the Philippine crocodile but has developed into a general biodiversity conservation organization with a focus on the northern Sierra Madre, Cagayan Valley and northern Cordillera in north Luzon. Merlijn's research interests include biodiversity distributions, impact of human activities on biodiversity, conservation effectiveness and the impact of environmental education and communication.

# Plenary Presentation

## Remote sensing in support of biodiversity studies: opportunities and challenges

**Ariel C. Blanco**[1,2] and Ayin M. Tamondon[1,2]

REMOTE SENSING HAS PROVIDED ENRICHING CAPABILITIES in so far as biodiversity studies are concerned. Various platforms and sensors are useful in providing synoptic and detailed data and information on both terrestrial and coastal marine environments. Complementing the Landsat system, the ESA Sentinel program has made available for free radar, optical and other satellite images that are being used for improved habitat mapping, change detection, and damage assessments. Algorithms are applied to estimate leaf area index from these images. Also, with the availability of free image processing software like SNAP, extraction of information from imagery has become accessible. LiDAR data coverage in the Philippines is continuously increasing, making available information on canopy height, percentage cover, biomass estimates, and other useful parameters. Unmanned aerial systems (UAS) are becoming more affordable and easier to operate. Depending on the sensor payload, these systems can provide 3D data, high-resolution orthomosaics and other products like vegetation indices (e.g., NDVI, GRVI). With this increased availability of remote sensing data and processing tools, opportunities to periodically and reliably map vegetation cover, density, 3D structure, biomass, vegetation health, tree counts, and even animal sightings are realizable. In addition, remote sensing can be used for assessing stressor, including the estimation of land and sea surface temperatures, and also water quality. However, challenges remain in order to maximize benefits. These include the integrated use of various platforms and sensors, development of automated workflows, and the development of indices or measures which are ecologically relevant and meaningful.

[1] Department of Geodetic Engineering, College of Engineering, University of the Philippines Diliman, Quezon City

[2] Training Center for Applied Geodesy and Photogrammetry, College of Engineering, University of the Philippines Diliman, Quezon City

# Plenary Presentation

## Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Philippines' Hosting of the 12th Meeting of the CMS Conference of the Parties

**Wildlife Resources Division, Biodiversity Management Bureau–Department of Environment and Natural Resources***

THE PHILIPPINE IS HOST TO A NUMBER OF MIGRATORY SPECIES that periodically utilized the country's coastal marine, inland wetlands and forests ecosystems. Over 150 species of migratory birds annually visit the Philippines. Being part of the East Asian-Australasian Flyway, migratory birds in their southward migration stop in the rich coastal and marine, inland wetlands and forests to feed and refuel before taking on to their journey further south. Some of them also winters in the country. Several migratory bird sites are internationally important hosting substantial population of migratory birds. These are Olango Island Wildlife Sanctuary, Naujan Lake National Park, Tubbataha Reef Natural Park, Negros Occidental Wetland Conservation Area, Bangrin Marine Park, Cabusao wetlands, LPPCHEA, Balanga City Wetlands Parks, Agusan Marsh Wildlife Sanctuary, among others. The Philippine is also considered an important habitat of the highly endangered marine turtles. Of the eight species of marine turtles in the world, 5 are recorded to occur in the Philippines. In Turtle Islands, Tawi-tawi, the country harbors one of the most significant and the only remaining major nesting population of green turtles (*Chelonia mydas*) in the ASEAN Regions; twenty eight (28) species of marine mammals were also confirmed present in the Philippine waters. These include dolphins, toothed whales and porpoises, baleen whales species, and the dugong. The abovesaid species are highly migratory and are especially vulnerable to various threats, such as degradation of breeding areas, shrinking of habitat, etc. In view thereof, effective conservation/management requires international support and cooperation;

* wrd@bmb.gov.ph

# Plenary Presentation

**Convention on the Conservation of Migratory Species of Wild Animals (CMS) and the Philippines' Hosting of the 12th Meeting of the CMS Conference of the Parties**

The Convention on the Conservation of Migratory Species of Wild Animals, also known as CMS or the Bonn Convention is an intergovernmental treaty concluded under the aegis of the United Nations Environment Programme (UNEP). CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. It brings together the States through which migratory animals pass, or the Range States, and lays the legal foundation for internationally coordinated conservation measures. Migratory species are good indicators of the state of the environment. Their population serves as a mirror of the ecological integrity of coastal and marine ecosystems, inland wetland ecosystems, and forest ecosystems. The Philippines is a major pathway for several species of migratory birds as well as turtles, sharks, whales, dolphins and fishes. The country is a Party to the Convention since 1993.

From 22–28 October 2017, the Philippines will host the CMS 12th Conference of Parties (COP12) meeting at the Philippine International Convention Center in Manila. About 900 participants, including observers coming from 124 Parties, are expected to attend the Conference. The COP is an opportunity to work with other CMS Parties on strategies and work programs for the continued protection and sustainable use of migratory species while promoting improved environmental management and enhancing trans-boundary cooperation on migratory species management for the benefit of environment, wildlife and people.

# Plenary Presentation

## CMS and the conservation of migratory sharks and other marine wildlife

**Moonyeen Nida R. Alava***

Cognizant that species do not recognize political borders, the Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) brings range states, or states through which migratory animals pass, to cooperate for the sustainable management of migratory species that move across national boundaries and whose life histories make them vulnerable to exploitation in more than one country. It lays the legal foundation for internationally coordinated conservation measures throughout the migratory range of a species.

CMS is a framework convention wherein agreements may range from legally binding treaties (e.g., agreements) to less formal instruments (e.g., memoranda of understanding or MOUs). The MOU on the Conservation of Migratory Sharks was initiated by CMS Signatories in 2007, with the final document, opened for signature in 2010 in Manila, Philippines, covering seven species. The Sharks MOU now covers 29 chondrichthyan species, resulting from amendments in 2014 and 2016. This is signed by 41 States (which includes the Philippines) and eight cooperating partners. The MOU is the first global instrument for the conservation of migratory shark species. It adopted the Migratory Sharks Conservation Plan with has the following objectives: improving the understanding of migratory shark populations through research, monitoring and information exchange; ensuring that directed and non-directed fisheries for sharks are sustainable; ensuring to the extent practicable the protection of critical habitats and migratory corridors and critical life stages of sharks; increasing public awareness of threats to sharks and their habitats, and enhancing public participation in conservation activities; enhancing national, regional, and international cooperation; improving the understanding of migratory shark populations through research, monitoring and information exchange; ensuring that directed and non-directed fisheries for sharks are sustainable; ensuring to the extent practicable the protection of critical habitats and migratory corridors and critical life stages of sharks; increasing public awareness of threats to sharks and their habitats, and enhancing public participation in conservation activities; enhancing national, regional, and international cooperation.

The 12th CMS Conference of the Parties will be held here in Manila, Philippines on 23–28 October 2017. The Philippine government is proposing for the up-listing of whale sharks (*Rhincodon typus*) from Appendix II to Appendix I and listing of the white-spotted wedgefish (*Rhynchobatus australiae*) in Appendix II.

At least two other marine wildlife species groups with MOUs initiated by CMS Signatories to which the Philippines is a range state include marine turtles covering seven species in the Indian Ocean and South-East Asian region (http://www.ioseaturtles.org/) and the dugong (http://www.cms.int/dugong/en).

* Executive Director, Coastal Conservation and Education Foundation, Inc.
302 PDI Condominium, Archbishop Reyes Ave., Banilad, Cebu City 6000 Philippines
Email: executive_director@coast.ph; Telefax: 032 233-6909; Website: www.coast.ph

# List of Titles
# Oral Presentations

## High School



## Undergraduate

# List of Titles
# Oral Presentations

## Regular

# List of Titles
# Oral Presentations

# List of Titles
# Oral Presentations

# HIGH SCHOOL
# Oral Presentations

### Change detection of mangrove coverage in Masinloc and Palauig, Zambales from 1995, 2005, and 2015 using remotely-sensed imagery

**Victoria Aubrey C. Manalo**, Gabrielle S. Long, Gabrielle Pauline A. De Guzman, Karizz Anne L. Morante

*Philippine Science High School – Central Luzon Campus*

Mangroves can survive in hostile environmental conditions and provide diverse vital ecological services, such as nursery for marine species and coastal erosion reduction. However, they are presently endangered due to anthropogenic activities and natural calamities. Due to this, it has become necessary to raise awareness on the state of the mangroves. The changes on the coast of two municipalities in Zambales, Philippines, namely Masinloc and Palauig, from the years 1995 to 2005 to 2015 were studied through mapping and assessing the accuracy of the 2015 map of the mangroves to test its reliability. Change detection was done with the use of three software programs, namely ENVI, QGIS, and ArcGIS. Land Satellite images were acquired from the United States Geographic Survey. The images went through preprocessing, classification, post classification, and accuracy assessment. Randomly generated ground truth points were selected from the map and tested on the field. Results showcased that from 1995 to 2005, the computed theoretical area of mangroves decreased by more than half, and from 2005 to 2015, the theoretical area increased by more than half. Therefore, the mangroves in the study area changed in density. For the accuracy assessment, an overall accuracy of 70% was obtained for the map with a kappa coefficient of 0.55. In conclusion, the study had a user's accuracy of 100%, a producer's accuracy of 66.7% and an overall accuracy of 70%. Thus, it is recommended that the availability of satellite images and pixel movement in each image should be considered to improve results.

### GIS-based suitability analysis of possible nesting sites of the *Pithecophaga jefferyi* (Philippine Eagle) at Mt. Apo forests

Yyoni Xandria Marie Tiu and **Harriet Elaine Limpot**

*Philippine Science High School – Southern Mindanao Campus*

The study aimed to determine the weights of the parameters identified by the Philippine Eagle Foundation (PEF) that affect the Philippine Eagle's choice of nesting habitat through survey of experts and application of statistical analysis. Moreover, it aimed to generate a map highlighting areas in Mt. Apo that are most suitable for nesting. This study would serve as a guide to the Philippine Eagle Foundation in determining areas for possible releases of captive-bred and/or rescued adult Philippine Eagles to the wild. This would then provide a secured habitat and give a higher chance of survival for the Philippine Eagles which are currently labeled Critically Endangered by the International Union for Conservation of Nature (IUCN). After gathering relevant data, nine parameters from the Site Suitability Assessment of PEF were categorized into four main criteria, namely: tree density, topography, human habitation, and prey density. Sub-criteria under each main criterion were also identified: under Tree density — basal area, forest trail, and presence of suitable branch; under Topography — forest edge, elevation, and distance from rivers; under Human Habitation — human population and kaingin areas; and under prey density, 14 species were identified to be part of the eagle's dietary needs. Through statistical tools, specifically pairwise comparisons and Analytic Hierarchy Process (AHP), it was determined that among the four main criteria, prey density had the most valued significance, followed by tree density, topography and human habitation. A consistency ratio test was also conducted wherein it was determined that the results from the pairwise comparisons were indeed consistent. Integrating the AHP results with the spatial analysis capabilities of ArcGIS, nine sites were identified to be suitable Philippine Eagle nesting sites.

# UNDERGRADUATE
# Oral Presentations

### Bioacoustics analysis in Philippine hornbills

**Shari L. Guerra**[1] and Juan Carlos T. Gonzalez[1,2]

[1]*Institute of Biological Sciences, University of the Philippines Los Baños*
[2]*Museum of Natural History, University of the Philippines Los Baños*

The vocalization of Philippine hornbills and their implications to delimiting species are not well understood. This study described and compared recorded calls of seven hornbill taxa in captivity namely Mindanao Wrinkled hornbill (*Rhabdotorrhinus leucocephalus*), Rufous-headed hornbill (*Rhabdotorrhinus waldeni*), Luzon Rufous hornbill (*Buceros hydrocorax hydrocorax*), Visayan Rufous hornbill (*Buceros hydrocorax semigaleatus*), Mindanao Rufous hornbill (*Buceros hydrocorax mindanensis*), Mindanao Tarictic hornbill (*Penelopides affinis*), Samar Tarictic hornbill (*Penelopides samarensis*), Visayan Tarictic hornbill (*Penelopides panini*), Luzon Tarictic hornbill (*Penelopides manillae*), as well as comparison with non-native Papuan hornbill (*Rhyticeros plicatus*). Vocalizations used were analyzed following the criteria proposed by Tobias et. al (2010) which quantified the call duration, maximum frequency, minimum frequency, bandwidth, and peak frequency. For each species in the sample, the mean and standard deviation were used to calculate the Cohen's d statistic by using an effect size calculator. Results showed that the effect size for minimum frequency was small for *P. panini* and *P. samarensis*, and *B. hydrocorax* and *B. m. mindanensis*. However, bandwidth, duration, minimum frequency, maximum frequency, and peak frequency have large effect sizes for the rest of the allopatric species pairs. For hornbills, their conspicuous resonating calls are sufficiently quantifiable for bioacoustic analysis following a standard criterion for species delimitation.

### Ectoparasite diversity and rates of reinfestation in a roost of *Scotophilus kuhlii* (Chiroptera: Vespertilionidae) from National Crop Protection Center (NCPC), Los Baños, Philippines

**Daniel Dave D. Bernaldez**[1], Phillip A. Alviola[1], James DV. Alvarez[2], Jeremy Naredo[2]

[1]*Institute of Biological Sciences, University of the Philippines Los Baños*
[2]*Museum of Natural History, University of the Philippines Los Baños*

Mechanics of ectoparasitism in a roost of *Scotophilus kuhlii* was studied using capture-mark-recapture method. Bat parameters such as age, sex, weight, and forearm length were assessed of their influence on parasitism rates, during capture and recapture events. Eight hundred forty-nine ectoparasites representing four acarine species and three families were extracted from 44 individuals of *Scotophilus kuhlii* from a single roost in NCPC on November 2015 to March 2016. The macronyssid mite *Steatonyssus faini* had the highest prevalence, mean abundance (MA), and mean intensity (MI), infesting 93% (MA=18, MI=19) of first captures and 80% of recaptures (MA=14, MI=17). There was no significant difference on the abundances of each ectoparasite species collected on capture and recapture. On the other hand, there is a significant difference between male and female bats in terms of parasite load (X2=4.383, p=0.036). However, other bat attributes such as age, weight, and forearm length does not seem to have any relationship with infestation rates. A total of 20 recapture events was recorded, with a range of 7–35 days elapsed from first capture. Linear regression analysis showed that parasite load increased with days elapsed from first capture ($r^2$=0.3989, p=0.012). This is the first study of ectoparasite reinfestation rates in the Philippines.

# UNDERGRADUATE
# Oral Presentations

### Effects of temperature variations on the clutch size and prosome length of *Arctodiaptomus dorsalis* (Marsh, 1905) from a cluster of seven maar lakes found in Luzon Is. (Philippines)

**Sean Hirshel L. Cusi**, Irian Joseph L. Biag, John Angelo B. Tan,
Edna Marie Mijares, Dino T. Tordesillas, Rey Donne S. Papa

*University of Santo Tomas*

*Arctodiaptomus dorsalis*, an invasive neotropical calanoid copepod, was recently found in the seven maar lakes of San Pablo, Laguna. Its establishment in the Philippines led to the displacement of native, and/or endemic calanoid copepods. As such, we need to determine why it became a successful invader in Philippine lakes including aspects of its biology and life history haven't been studied in populations outside its original geographic distribution. Previous studies suggest that among calanoid copepods, as prosome length (PL) increases, clutch size (CS) also increases, and as temperature increases CS and PL decreases. This study aimed to determine the relationship between the CS and PL of *A. dorsalis*, and observe if the temperature profile of the lakes have effects on *A. dorsalis* populations in these lakes. Collection of ovigerous *A. dorsalis* and temperature measurements were conducted from October to December, 2016. Analyses of temperature profiles of the lakes, CS, and PL of ovigerous females showed significant variability, with the temperature ranging from 24.22°C to 31.11°C, CS from 2 to 23 per clutch, and PL from 0.609 mm to 1.03 mm. Also, no ovigerous females were collected in Lake Calibato. PL & CS of all samples showed a positive correlation ($\rho = 0.595$) while the ratio of the CS & PL in relation to temperature was found to have a weak correlation ($\rho = 0.250$). These results imply that in these lakes, temperature did not play a significant role in the reproductive capacity of *A. dorsalis* during this time of the year.

### Effects of urbanization on biodiversity: a comparison of stream benthic macroinvertebrates in the Upper Marikina River Basin Protected Landscape and other sites in the Marikina Watershed

**Alexis E. Belen**[1], Gelsie Rose Buenaventura[1], Francis Godwin G. Cantre[1], Katharine Grace R. Espiritu[1], Jana Nicole A. De Vera[1], Cristine P. Perez[1], Aleziz Kryzzien V. Tan[1], Elfritzson M. Peralta[2], Irisse Bianca B. De Jesus[2], Paul Q. Palomares[3], Jonathan Carlo A. Briones[1,2,5], Tohru Ikeya[4], Francis S. Magbanua[3], Rey Donne S. Papa[1,2], Noboru Okuda[4]

*[1]Department of Biological Sciences, University of Santo Tomas (UST); [2]Research Center for Natural and Applied Sciences, UST; [3]Institute of Biology, University of the Philippines Diliman; [4]Research Institute for Humanity and Nature; [5]The Graduate School, UST*

The Marikina Watershed is considered to be one of the most critical watersheds in the country for it supports a wide area and supplies water for domestic and industrial use. But due to the rise of population and urbanization of the country, some of the areas of the Marikina Watershed were affected and the water quality has drastically changed. Thus, the Upper Marikina River Basin Protected Landscape (UMRBPL) was established to rehabilitate the Marikina Watershed. This study aims to provide a distinction between benthic macroinvertebrate communities in urban areas and rural areas such as the UMRBPL, thus comparing the response of benthic macroinvertebrates to streams with different physicochemical conditions along the Marikina Watershed. Sixteen sites were chosen for this study with sites U1–U8 near urban communities and sites R1–R8 in areas of the UMRBPL. The physicochemical parameters were tested on-site and benthic macroinvertebrates were sampled using a Surber Sampler. It was found that species from orders Ephemeroptera, Plecoptera, Trichoptera, and Coleoptera were more abundant in sites R1–R8; and Dipterans, were more abundant in sites U1–U8. This is due to the pollution tolerance of the benthic macroinvertebrates; dipterans are more resistant to pollution thus species under Ephemeroptera, Plecoptera, Trichoptera, and Coleoptera are good bioindicators for pollution. It was found that some protected landscape sites are in line to have poor water quality, negatively influencing the bioindicators; also an increase in urban communities negatively influenced the benthic macroinvertebrate community, which therefore poses a serious threat to the biodiversity of the organisms.

# UNDERGRADUATE
# Oral Presentations

### Emergence behavior of a multi-species assemblage of bats in a cave on Mt. Makiling Forest Reserve, Philippines

**Frex D. Dimaculangan**[1], Phillip A. Alviola[1], James DV. Alvarez[2], Jodi Sedlock[3]

[1]*Institute of Biological Sciences, University of the Philippines Los Baños*
[2]*Museum of Natural History, University of the Philippines Los Baños*
[3]*Lawrence University*

In this study, the the nightly emergence behavior and population of a multispecies bat assemblage at a cave in Mt. Makiling Forest Reserve were recorded for four months from December 2015 to March 2016 using video recording and echolocation call recording during bat emergence. Bats captured during emergence produced a long constant frequency (CF) calls of varying frequencies. *Rhinolophus macrotis* (n=21) produced CF with mean frequency at 52.5 ± 0.1 kHz, *Rhinolophus arcuatus* (n=1) at 68.9 kHz, *Rhinolophus inops* (n=1) at 54.7 kHz and *Rhinolophus virgo* (n=6) at 84.3 ± 0.9 kHz. Fluctuation in the daily emergence count was observed. The highest number of bats counted per month were as followed: 410 individuals in December 2015, 530 individuals in January 2016, 389 individuals in February 2016 and 559 in March 2016. A shift in the number of emerging bats from a different entrance was observed by early January. It was also observed that bats timed its one-hour emergence with sunset having the peak emergence usually after 20 minutes from the first emergence (December to January) but during February and March the peak emergence approached closer to the time of emergence. Temperature and relative humidity were not correlated with the number of bats emerging ($p>0.05$). Echolocation call recordings during emergence showed that *R. macrotis* was the first to emerge and it maintained a constant flow within the one hour emergence. The other three species exited variably during four month study.

### Population status and habitat requirements of the threatened Visayan hornbills in Central Panay Mountains, Panay Island

**Al Christian D. Quidet**[1], Lisa J. Paguntalan[2], Dennis A. Warguez[1], Andrew Ross Reintar[2], Cesar G. Demayo[1], Philip Godfrey Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc*

A study on the abundance and habitat requirements of Visayan hornbills was conducted in Central Panay Mountains (CPM) using Point Count method and 88 30 x 30 meter plots for habitat assessment from July 25 to August 2, 2016. A total of 47 critically endangered Rufous-headed hornbill *Rhabdotorrhinus waldeni* and 22 endangered Visayan tarictic hornbill *Penelopides panini* were recorded. Both hornbills were abundant in primary lowland forest and occur at elevations ranging from 396–860 masl and 396–831 masl, respectively. Abundance estimate of hornbills was done in Mt. Camantra and Mt. Igpako. Logistic Regression analysis showed that Rufous-headed hornbill prefer large, tall, trees with DBH of at least 90 cm ($p=0.002$). Lying dead tree ($p=0.001$) and distance to water clearing ($p=0$) is correlated to food resource and nesting purposes, respectively. *P. panini* are more likely to be seen in close canopy forest with 31–50 DBH ($p=0$). CPM is a key conservation site for the two globally threatened species. The information on the ecology of the species as well as its population will be significant inputs for the management of the remaining forests of Panay and to the conservation of the two threatened endemic species.

# UNDERGRADUATE
# Oral Presentations

## Role of sensory cues in fruit selection of *Ptenochirus jagori* (Chiroptera: Pteropodidae) in captive conditions

**Elyzza Marie A. Toledo**[1], Phillip A. Alviola[1], James DV. Alvarez[2]

[1]*Institute of Biological Sciences, University of the Philippines Los Baños*
[2]*Museum of Natural History, University of the Philippines Los Baños*

The role of sensory cues in fruit selection of *Ptenochirus jagori* in captive condition was observed and evaluated for four months (January to April 2016). Bats captured were subjected to four different treatments namely, (experiment 1) fruit appearance—fruit wrapped with clear plastic vs. fruit painted white wrapped with clear plastic, (experiment 2) fruit abundance—clustered fruit vs. single fruit, (experiment 3) olfaction vs. fruit appearance—real fruit vs. artificial fruit, and (experiment 4) same olfactory cues but different structure of fruit—real fruit vs. sponge with fruit extract. The number of feeding approaches and the time spent for each treatment were recorded. The fruit species used was banana (*Musa sapientum* var. *lakatan*), which initial feeding trials and published literature indicate is the usual preferred cultivated fruit of *P. jagori*. Paired t-test was used to test the significance across the various treatments of four experiments. No significant differences in the number of approaches and time duration between treatments were found for experiment 1. On the other hand, mean number of bat approaches in experiments 2, 3, and 4 were significantly higher for clustered fruit (mean= 7.5, $p = 0.048$), real fruit (mean= 6.7, $p = 0.029$), and sponge saturated with fruit extract (mean= 8, $p = 0.0032$), respectively. The results suggested that fruit selection by *P. jagori* can be influenced by fruit clustering and strong odor of ripening fruit. Moreover, the observed results also suggested that olfactory cues are more important than fruit shape and color in the selection of *P. jagori*.

# Oral Presentations

### A Chiropteran Integrity Index of terrestrial ecosystem health in five geothermal reservations in the Philippines

**Jay S. Fidelino**, Mariano Roy M. Duya, Perry S. Ong

*Biodiversity Research Laboratory, Institute of Biology, University of the Philippines Diliman*
*Diliman Science Research Foundation, Inc.*

Under the Biodiversity Conservation and Monitoring Program (BCMP) of the University of the Philippines Diliman Institute of Biology (UP Biology) and the Energy Development Corporation (EDC), a multimetric index for forest health assessment had been developed using bat mist-netting data from 2012 to 2017. The resulting index can be used to assess the effects of site development, including rehabilitation efforts. Within each GPF, a total of 44 metrics of abundance, richness, composition, functional traits, and conservation status were tested for the ability to discriminate between "reference" and "development" sites. After standardization to a 0–100-point scale, correlation between metrics was assessed using Pearson's r. Among correlated metrics, only the metric with the highest discriminatory efficiency was selected as a core metric. Core metric values were transformed into unit-less scores of 1, 3, and 5, and a site's Chiropteran Integrity Index was calculated as the sum of its scores for all core metrics. Twenty-three different metrics were accepted into the index across all five sites, with five to ten selected per GPF. Four of these metrics were accepted in all but one site. Endemism metrics and abundance and composition metrics for species that increase in abundance in development sites appear to be important in discriminating between reference and development sites. To further refine the index, additional sampling should be done, especially in development sites. The index can be used to guide how development sites could be restored to a state as close to the reference sites as possible.

### A model to establish and sustain community conserved areas

**Merlijn van Weerd**[1], Marites Gatan-Balbas[1], Joni Acay[1], Bernard Tarun[1], Myrna Cauilan-Cureg[2]

[1]*Mabuwaya Foundation*
[2]*Department of Development Communication, Isabela State University*

Protected areas are crucial to maintain biodiversity and ecosystem functions. The Philippines has a national integrated protected areas system that protects most of the key biodiversity areas of the country. However, there are many smaller areas that are important for multiple or single species that remain unprotected. Often these areas are used by people, and are under threat of hunting and habitat loss. The Philippines is one of the first countries that has accepted a novel approach to protect these areas locally through the establishment of Community Conserved Areas (CCA). The Mabuwaya Foundation has worked with communities in northeast Luzon since 2003 to establish CCAs to protect critical habitats for several threatened species. We have learned from our experiences and have developed a model to establish community conserved areas, monitor their effectiveness and sustain their management. The model consists of several steps: 1) Biological field research identifies critical habitats, 2) social field research identifies socio-economic drivers of threats and levels of local awareness and knowledge, 3) a theory of change is developed on the basis of social and ecological research findings, 4) community engagement campaigns are employed to increase support for and participation in conservation, 5) a consensual CCA is declared based on research findings and community inputs, 6) capacity building establishes a local management and environmental law enforcement system, 7) management effectiveness is monitored by a local team assisted by professionals and management is adjusted if necessary. We present this successful model with several examples and monitoring data.

# Oral Presentations

### Addressing gaps in wildlife law enforcement using enforcement analysis tools

**Glenn M. Forbes**, Edward G. Lorenzo, Marina Rabe-Manuel

*Protect Wildlife Project*

Despite existing policies and Philippine initiatives, the country remains a wildlife trafficking hotspot. Poaching endangered species such as pangolins, wild birds, marine and freshwater turtles continues. Losing local wildlife populations endanger stability of their habitats. Several ports in Palawan, Tawi-Tawi, and Zamboanga Peninsula serve as major transshipment points for both domestic and international wildlife trafficking. There is a need to strengthen capabilities of various law enforcement agencies, develop tools to effectively network, share information, take individual and collective enforcement actions, and sustain efforts over time. This paper discusses the results of violation assessments in Palawan, Tawi-tawi, and Zamboanga Peninsula under the USAID-funded Protect Wildlife Project. It analyses the wildlife law enforcement continuum—from detection, apprehension, prosecution, and adjudication. The paper highlights self-assessments of law enforcement groups in terms of their capability to enforce wildlife laws. It emphasizes the link between enforcement law capability with effectiveness to conduct real-time law enforcement in-situ in wildlife habitats, and ex-situ at the country's various ports of entry and exit. The paper proposes how enforcement groups in transshipment sites can pilot-test a networked approach, link the ports together, and subsequently connect these with the national government offices in Metro Manila. The networking approach with the use of geospatial analysis and available enforcement and planning tools is expected to address wildlife trafficking and fine-tune for use in different areas of the country. With this analysis, we hope to improve the protection of wildlife and wildlife habitats in Palawan, Zamboanga Peninsula, and Tawi-Tawi.

### Alien amphibians, a threat to Philippine biosecurity: Developing a National Invasive Alien Amphibian Species Watch List

**Arman N. Pili**[1], Mae Lowe L. Diesmos[2,3], Emerson Y. Sy[4], Arvin C. Diesmos[5]

[1]*The Graduate School, University of Santo Tomas (UST)*
[2]*Research Center for the Natural and Applied Sciences, UST;* [3]*Department of Biological Sciences, College of Science, UST*
[4]*Philippine Center for Terrestrial and Aquatic Research*
[5]*Herpetology Section, Zoology Division, National Museum of the Philippines*

The negative implications of invasive alien species to global biodiversity conservation highlights the urgency to develop sound policies and action plans for the management of their invasions. A critical aspect of contemporary biosecurity practice are preventive measures such as Watch Lists, which involves horizon scanning for potential invasive alien species based on their probability of success in each stage of the invasion process. Here, we developed an invasive alien amphibian Watch List by horizon scanning for alien amphibians with the potential to threaten Philippine biodiversity based on consistent predictors of invasion success, namely, invasion history, climate match, and propagule pressure. Each was measured respectively using online databases and scientific literature, Biome Distribution Modelling, and Philippine trade and tourism data. The alien amphibians that satisfy these three predictors were classified as Watch List species. Currently, there are 7,645 species of amphibians worldwide, of which 102 has a history of successfully establishing populations outside their native range. Of these 102 alien amphibians with invasion history, 72 occur in areas that are climatically similar to at least one Philippine biome, and with propagule pressure to the Philippines, hence classified as "Watch List" species. Evaluation of the procedure resulted in the successful prediction of 5 of 6 alien frogs that are currently occurring in the country, indicating high sensitivity. This study provided the needed scientific information that can aid in developing policies and action plans for the prevention of future alien amphibian introductions.

# Oral Presentations

### *Aretidris*, a new genus of ants (Hymenoptera: Formicidae) from the mountains of Luzon

**David Emmanuel M. General**

*Museum of Natural History, University of the Philippines Los Baños*

A new genus of myrmicine ants is described from high-elevation mountains of Luzon Island, Philippines. Previous molecular studies and morphological evidence are discussed. This new genus is distinguished by the following combination of characters: mandibles with long narrow basal stem; gena bounded by longitudinal ridge; labrum visible in full-face view; anterior margin of katepisternum thickened; propodeum convex and armed with denticles; petiole sessile; and tooth or angle above petiolar spiracle. *Aretidris* General, 2015 includes two new species: *A. buenaventei* from Mt. Palali, Nueva Vizcaya Province and *A. clousei* from Mts. Bulusan and Isarog in the Bicol Peninsula. This new genus is also compared with its sister genera in the clade, namely *Vollenhovia* and *Calyptomyrmex*.

### Assessing the vulnerability to climate change of some of the Philippines' endemic mammals

**Josefa Isabel Tauli**[1], Al John Cabañas[1], Marie Antoinette Torres[2], Fayte Sicnawa[2], Judeline Dimalibot[3]

[1]*Graduate School, University of the Philippines Los Baños*
[2]*Institute of Biological Sciences, University of the Philippines Los Baños*
[3]*Animal Biology Division, University of the Philippines Los Baños*

Climate change is most likely to threaten the country's endemic species, hence there is an urgent need to pinpoint which of these species are most vulnerable and why. The study aimed to assess the climate change vulnerability of 32 mammalian species of the Philippines, composed mainly of endemic insect bats and rodents, and the Philippine tarsier. To do this, we looked into the applicability of NatureServe's Climate Change Vulnerability Index which, when sufficient evidence is available, categorizes a species into less, moderately, or extremely vulnerable to climate change by scoring factors that affect its exposure, sensitivity, and capacity to adapt to climate change based on available literature. For the species assessed, common threats include the narrow hydrological and thermal ranges that the species experience, especially in the case of endemic rodents confined to certain elevations on their respective mountain ranges; as well as the effect of the higher predicted frequency of natural disturbances which could cause significant habitat destruction. Moreover, the restriction of cave-obligate bats to their unusual habitat also increased their vulnerability. Although evaluations were successfully obtained for many of the species using the index, we found that the limited literature available on many species' life histories and the absence of local climatic data required by the index prevented us from obtaining more definite results. With assessments like these, specific causes of vulnerability of endemic mammalian species to climate change become clear, making it possible to put in place appropriate management and conservation actions in response.

# Oral Presentations

### Calamian deer *Axis calamianensis* conservation in Busuanga Island, Palawan

**Joshuael C. Nuñez**, Peter Jurgen Widmann, Indira Dayang-Lacerna Widmann

*Katala Foundation, Inc.*

The Calamian Deer is restricted to the Calamian group of islands, within the Palawan faunal region. We present first findings on population status, threat factors, current distribution based on initial results of distance sampling, and interview surveys. Rampant poaching is likely the leading threat factor for the species, particularly also in Calauit Wildlife and Game Reserve, which is subject to massive influx of settlers. Habitat destruction and degradation are further reasons for the decline of the species. Aside from poaching, other factors leading to direct losses of deer include uncontrolled grass- and woodland fires, fencing with barbed wires, and stray dogs. Initial estimates using Distance Software indicate that there are 330 individuals in the island of Calauit. The population density inside the headquarters is higher than that of the area outside. Initial recommendations for the conservation of the species include stepped up law enforcement to prevent and reverse squatting and poaching, resolution of the overlapping land use claims in Calauit, development of an ex-situ population for later reintroduction into suitable habitats, identification and development of suitable areas for reintroduction, and conservation education.

### Development of a Flora Index for forest health assessment in five geothermal production fields

**David Justin R. Ples**[1], Edwino S. Fernando[1,2], Perry S. Ong[1]

[1]*Biodiversity Research Laboratory, Institute of Biology, University of the Philippines Diliman*
[2]*Department of Forest Biological Sciences, College of Forestry and Natural Resources, University of the Philippines Los Baños*

Under the Biodiversity Conservation and Monitoring Program (BCMP) of the University of the Philippines Institute of Biology (UP Biology) and the Energy Development Corporation (EDC), a unique Flora Index to measure forest health was generated for each of five EDC Geothermal Production Fields (GPF): Northern Negros (NNGPF), Southern Negros (SNGPF), Bacon-Manito (BMGPF), Leyte (LGPF), and Mt. Apo (MAGPF). Various metrics of species richness, abundance, assemblage and size class were tested for their ability to discriminate between transects established in either "reference" or "development" areas. The resulting candidate metrics for each site were then screened for correlation using the Pearson's test before core metrics were selected. Transects were graded through the application of a discrete scoring method, and the sum of marks per metric was taken as that transect's index score. Finally, the range of values per area was used to construct a qualitative rating system from "Very Poor" to "Excellent". Each site yielded between six to nine core metrics; Fisher's α was the only metric used across all five sites. Metrics on the presence of exotic species and taxa were also prominent, and their detrimental effects were clearly reflected in the scores received by development areas. Additionally, the size classes 10–30 cm and 30–60 cm DBH were found to be the most relevant. The index may be used to guide restoration of development sites to a state as close to the reference sites as possible, as well as to monitor the impact of EDC's operations and identify areas for improvement.

# Oral Presentations

### Distribution and diversity patterns of herpetofauna in Pantabangan–Carranglan Watershed, Nueva Ecija, Caraballo Mountain Range

**Paul Henric P. Gojo Cruz**[1], Leticia E. Afuang[2], Juan Carlos T. Gonzalez[3], William SM. Gruezo[4]

[1]*Department of Biological Sciences, Central Luzon State University*
[2]*Institute of Biological Sciences, University of the Philippines Los Baños*
[3]*Museum of Natural History, University of the Philippines Los Baños*
[4]*Graduate School, University of the Philippines Los Baños*

The recent extensive survey conducted in the Pantabangan-Carranglan Watershed, part of the Caraballo Mountain Range during the rainy season (October to November) resulted in the discovery of 60 species of amphibians and reptiles (17 frogs, 16 skinks, 9 lizards, 2 varanids, and 16 snakes). Forty-two species were Philippine endemics, of which 28 species are Luzon endemics. Habitat analysis and mapping showed seven habitat types including lowland dipterocarp forest (61%), grassland (13%), lower montane forest (12%), upper montane forest (7%), pine forest (4%), agricultural areas (2%) and riparian habitats. GIS-based distribution mapping showed that the number of individuals and species are high in forest and associated riparian habitats at mid-elevation (1000–1250 masl). Distribution patterns in the area is influenced by similarity in microclimatic conditions, availability of resources and niches which species can utilize. Shannon's Diversity Index (H') showed that species diversity is centered in mid- to high elevation forest and riparian habitats and in less disturbed areas. Snake diversity is adversely affected by increased disturbance, making them good indicators of the health of an area. Shannon's Diversity Index was 2.83. Abundance-based Similarity Index showed that connected habitat types and elevation gradients have higher species similarity.

### Evidences of a wider biogeographical distribution of the minute-marsh loving beetle genus *Caccothryptus* SHARP (Coleoptera: Limnichidae: Limnichinae) in the Philippines

**Emmanuel D. Delocado** and Hendrik Freitag

*Ateneo de Manila University*

Previous studies described the distribution of the riparian Minute-Marsh Loving Beetle genus *Caccothryptus* SHARP in the Philippines to be limited to the islands of Luzon and Masbate. This study intends to illustrate a more widely biogeographical distribution of the species in the Philippines. Additional specimens of museum and university collections were morphologically examined and dissected for determination. *C. nanus* and *C. ticaoensis* of the *C. jaechi* group and *C. zetteli* and *C. luzonensis* of the *C. zetteli* group are newly recorded in the islands of Mindoro, Palawan, Camiguin, and Mindanao. This demonstrates a wider distribution beyond a single intra-Philippine biogeographic region and reflects better dispersal abilities in these riparian insects in contrast to true aquatic beetles. Stacked microscopic habitus images and notes on the habitats of the newly recorded specimens are provided as well as a key to *Caccothryptus* species of the Philippines and an updated checklist of Philippine Limnichidae.

# Oral Presentations

### Geospatial analysis for integrating conservation and development-related land uses in Philippine landscapes

Ernesto Guiang and **Trina Isorena**

*Protect Wildlife Project*

The Philippines belongs to the world's 17 mega-biodiverse countries, home to about 1,100 terrestrial vertebrates and 5% of the world's flora. Philippine biodiversity provides ecosystems goods and services such as water, coastal protection, and recreation. Food, fisheries, timber, and non-timber products contribute to about 10% of gross domestic product. Biodiversity-related livelihoods support close to 30% of the labor force. Despite numerous laws, the Philippines remains as a biodiversity "hotspot." The threats are deforestation, settlements, agricultural expansion, urbanization, unregulated mining, and illegal harvesting. High poverty incidence creates tension points between land uses for conserving biodiversity and for development. A geospatial analysis generated five recommended land uses that are consistent with current policies. These are land uses for protection and conservation, production, settlements and built-up areas, hazard-related restricted use areas, and tourism for Mt. Mantalingahan Protected Landscape (MMPL) in Palawan and Zamboanga City in both public lands and alienable and disposable areas. The policy-based and spatially-determined land uses helped facilitate discussions among stakeholders. Agreements are to legitimate conservation areas and wildlife habitats as "conservation zones" with enforceable ordinance as part of the local governments' comprehensive land use plans. The paper also discusses geospatial processes replication and scaling up for the application of DENR, NCIP, DA/BFAR, LGUs and local stakeholders.

### Knowledge integration and conservation: The case for indigenous *Bagobo* villages at Mt. Apo, Davao City

**Jayson C. Ibañez**

*Philippine Eagle Foundation*

The value of integrating scientific and indigenous knowledge systems to achieve sustainability has been mandated by several international conventions (e.g. UNDRIP, CBD, etc.). However, several Indigenous rights advocates treat such integration projects with suspicion given the pervasive asymmetrical power relations that exist between the holders of indigenous knowledge and mainstream conservation practitioners. Using a post-normal science and social constructionist theoretical frame, we initiated a conservation program that sought to combine indigenous ecological knowledge and scientific knowledge both in the conservation of the IUCN "critically endangered" Philippine Eagles *Pithecophaga jefferyi* and in enhancing indigenous empowerment and well-being. We particularly worked at Mt Apo in Davao City with two indigenous Bagobo sister tribes (*Bagobo Tagabawa* and *Obu Manuvu*) who have communal ownership over nearly 10,000 hectares of key biodiversity areas. We facilitated community development planning using a village-based indigenous planning process, and assisted the communities with plan implementation. Through "conservation agreements," we supported village efforts to monitor focal species and critical habitats, check and control biodiversity threats, enforce environmental laws, and rehabilitate degraded areas. To encourage biodiversity-friendly behavior and practices, we provided material and other incentives that address priority development outcomes as identified in their Community Development Plan. This paper describes how our holistic and place-based approach to conservation resulted to clear biodiversity conservation, economic, and socio-cultural outcomes. The Mt. Apo stories are presented as cases of equitable knowledge integration. The paper also demonstrates how the theory of "place attachment" and the principles of "decentralization" and "subsidiarity" might play out positively in community-based conservation.

# Oral Presentations

### Migratory raptor study in Barangay Rio del Pilar, Glan, Sarangani, Philippines

Steve Chiongbian Solon, Emma Peralta-Nebran,
Carilyn Salanio-Martin, **Joylyn R. Dayondon**, Jopy D. Cañeda

*Province of Sarangani–Environmental Conservation and Protection Center*

The Philippines is part of the Asian–Australasian flyway, a major route for migratory raptors. However, there is dearth of studies documenting the number and species of migratory birds coming from the Philippines. The province of Sarangani thru the ECPC, conducted a raptor watch study from September 15 to October 23, 2016 in Barangay Rio del Pilar, Glan, Sarangani. The study aimed to establish an information database of species, numbers, routes, habitats of migrating raptors; locate the important raptor roosting areas; and to validate the 2014 first migratory raptor observations in Glan. Raptors' sightings were counted from 6 am to 3 pm daily for 39 days. The migratory and non-migratory raptors were counted individually and/or estimated if in large number. Results showed a total of 78,817 migratory and 239 resident raptor counts composing of seven migrant and five resident raptor species. Migrant *Accipiter soloensis* composed more than 93% of the total count while *Butastur indicus* composed 6%. The migration peaks of *Accipiter soloensis* were on 28$^{th}$ day of September with 11,612 counts; and on the 8$^{th}$ and 9$^{th}$ day of October with 12,233 and 10,858 counts, respectively. Mts. Taltak and Gulo were observed to be the roosting sites of the migratory raptors. Results of the study strengthened the advocacy to conserve forest lands; become basis for the establishment of community-based birdwatching site; and finally, supported the conclusion of Tiongco that Sarangani is one of the major autumn migration routes of raptors crossing from the Philippines to Sulawesi, Indonesia.

### Molecular phylogeny and biogeographic distribution of pheretimoid earthworms (Clitellata: Megascolecidae) of the Philippine archipelago

**Nonillon M. Aspe**

*Western Philippines University*

The geological history of eastern Asia and western Pacific region especially during the Pleistocene must have played a significant role in the high species diversity in the region. Although studies on phylogeny and distribution were conducted on certain groups of plants and animals in the region, such study has not been done on earthworms due to lack of molecular data, despite the huge number of new species that has been discovered. Here, a phylogenetic and biogeographic analysis of the Philippine earthworms was conducted to provide insight on the species diversification and their distribution relation to the geological history of the archipelago. Bayesian inference was performed using the mitochondrial 16S rRNA, COI, 12S rRNA, nuclear 28S rRNA and histone H3 genes. The geographic distribution of earthworms was synthesized with a comprehensive analysis of the geological activities of Southeast Asia during the Cretaceous era. The resulting tree shows a strongly supported clade for the Philippine pheretimoid species. However, the genera included show to be non-monophyletic. The tree does not depict a clear pattern for the geographic distribution of the pheretimoid species. The migration of earthworms may have occurred intermittently and possibly from different entry points and active dispersal of earthworms across islands must have occurred during the Pleistocene when the sea level was shallower than the current sea level. The fluctuations in the sea level, climate changes and other ecological factors may have contributed in the distribution and rapid diversification of species.

# Oral Presentations

### Pair-wise comparison of species richness, diversity, and assemblage of fruit bats in secondary forests and reforestation areas in the Philippines

**Mariano Roy M. Duya**, Jay S. Fidelino, Perry S. Ong

*Biodiversity Research Laboratory, Institute of Biology, University of the Philippines Diliman*
*Diliman Science Research Foundation, Inc.*

Fruit bats, pollinators and seed dispersers, are integral components of tropical ecosystems and thus are critical in any forest restoration efforts. To be considered effective, forest restoration should lead to the reestablishment of ecosystem integrity, preceded by the succession of plant and animal communities as the ecosystem recovers. Several studies suggest that bats are excellent bio indicators due to their sensitivity to multiple environmental stressors. In this study, species richness, diversity, and assemblages of fruit bats in five reforestation areas in southern Luzon, northern and southern Negros, and Leyte were compared to those in nearby secondary forests. Mist-netting conducted from 2013 to 2015 in nine sites (five reforestation sites and four secondary forest sites) captured a total of 4131 individuals comprised of 14 species from a sampling effort of 849,060 $m^2 \bullet h$. Based on permutational MANOVA and non-metric multidimensional scaling ordinations, significant differences were found between the species assemblages in pairs of reforestation and secondary forest sites in southern Luzon, northern and southern Negros, and Leyte. Reforestation areas adjacent to or contiguous with intact forests tend to have fruit bat assemblages similar to that of secondary forests. Distance and continuity with intact forest appeared to be important factors in the restoration of ecosystem integrity in tropical forests. Long-term monitoring of assemblages of fruit bats and other potential important taxa is necessary to further elucidate the roles these play in forest restoration.

### People and crocodiles sharing one environment: a review on local human-crocodile conflict management strategies in the Philippines

**Meljory D. Corvera**, Rainier I. Manalo, Ma. Theresa R. Aquino

*Crocodylus Porosus Philippines, Inc.*

Crocodile conservation in the Philippines has always been challenging, especially when involving human-crocodile conflicts (HCC). This study aims to determine the leading cause of conflicts and local practices and management strategies that encourage coexistence. A review of recorded HCCs in the country from 2000 to 2015 showed that these mostly occurred in southern Philippines. Local practices and management strategies addressing such conflicts were likewise reviewed and documented. Results showed that human pressure in known crocodile habitats triggered the consequential events of 26 cases of HCC in the Philippines. Competitions for space due to the need for access to nature's basic services have resulted in human encroachment on crocodile habitat. In light of the growing human population, this competition is only to be expected yet not all encounters end in conflicts. In some areas, mutual co-existence with crocodiles was upheld by setting-up of makeshift bridge or making use of cultural veneration and indigenous knowledge of crocodile behavior. Other management efforts included the removal of potential conflict animals, display of warning signs, advocacy campaign, and provision of alternative livelihood and have been a common response of the government. The success or failure of these efforts can be inferred by the tolerance level of social acceptance and local knowledge of communities.

# Oral Presentations

### Phylogenetic study of the caddisfly subfamily Macronematinae (Trichoptera: Hydropsychidae)

**Christine Jewel C. Uy** and Yeon Jae Bae

*Korea University College of Life Sciences*

The phylogenetic study of the caddisfly subfamily Macronematinae (Trichoptera: Hydropsychidae) was done using molecular and morphological approaches. The monophyly of each tribes established by Lestage (1936) was not established using the mitochondrial COI gene. The study shows the monophyly in each genera of the subfamily except for the genus *Macrostemum*. This study also proves that the genus *Amphipsyche* is closely related to the genus *Protomacronema* which is probably based on the absence of discoidal cell in their forewing as once suggested by Barnard (1984). Based on molecular analyses, it was found out that genera *Centromacronema*, *Baliomorpha*, and *Macronema* are closely related with each other. This study is the initial investigation that concerns the subfamily Macronematinae.

### Population density of long-tailed macaques (*Macaca fascicularis*) in Puerto Princesa Subterranean River National Park, Palawan, Philippines

**Geneva Carla S. Chavez**[1] and Judeline C. Dimalibot[2]

[1]*Graduate School, University of the Philippines Los Baños*
[2]*Animal Biology Division, University of the Philippines Los Baños*

Despite the pervasiveness of the long-tailed macaque (*Macaca fascicularis*), there has been a huge gap in the current understanding of its ecology, population dynamics, and conservation status in the Philippines. In this study, a month-long survey of long-tailed macaques was conducted within the Puerto Princesa Subterranean River National Park during the dry season of 2016. Ten line transects were established in PPSRNP, each with a ground length of 2 kilometers, with no particular width due to differing broad habitat types, and were positioned with a distance not less than 100 meters. Transects were surveyed twice at a speed of 1 kph starting at 0600. All encountered individuals were recorded within an eight-minute sampling time to prevent any overestimation of density owing to additional groups entering the study area and double counting. Data were analyzed in the DISTANCE program, using perpendicular distances to every animal sighted. A total of 119 encounters were recorded and were right truncated at the largest 5% of distances. Conventional and multiple-covariate analyses generated similar detection and density estimates, suggesting that model selection may be of secondary importance for abundance inferences. Detection probability (mean ± SE) was 0.84 ± 0.034 (95% CI: 0.78–0.91) within 48.90 m, density was 0.263 ± 0.062 individuals $ha^{-1}$ (95% CI: 0.162–0.426), and population size was 5,731 ± 1,356 individuals (95% CI: 3,533–9,297) in 21,826.26 ha. More survey data are needed to better understand spatial density variation, test hypotheses about survey design, and evaluate management actions concerning long-tailed macaques in PPSRNP.

# Oral Presentations

### Rapid assessment of dugong (*Dugong dugon*) population and habitats in Hinatuan Bay, Surigao del Sur

**Reynante V. Ramilo**, Danica D. Lopez, Ginelle A. Gacasan

*C3 Philippines, Inc.*

Dugongs (*Dugong dugon*) are globally categorized as vulnerable and recently classed as a critically endangered marine mammal in the Philippines. Declining populations are caused by risk of bycatch, illegal fishing methods and habitat destruction and degradation. Historically, dugongs have been sighted around almost all of the islands in the country but remaining dugong populations today are sparse and scattered. Significant information on dugong population are sighted and reported in Hinatuan Bay, Surigao del Sur; thus, proposed to be a critical habitat for endangered dugongs and marine turtles. Study of dugong population and assessment of dugong sightings, grazing sites, condition of seagrass habitat and local threats were acquired through a combination of key informant and focus group interviews, boat-based surveys and habitat assessments for conservation strategies. Brgy. Portlamon and Sitio Pangasinan are regular dugong sighting areas. Areas in San Juan and Pangasinan are found to have several grazing marks evidenced by dense *Halophila* sp. dominated beds and presence of other dugong-preferred seagrass species such as *Syringodium* sp., *Cymodocea* spp. and *Thalassia* sp. Results confirm the presence of dugongs however indicate a very small population. This may be brought about by dynamite fishing and bycatch in fish corrals as the most significant threats to dugongs in Hinatuan. Furthermore, indirect threats include disturbance from heavy boat traffic and habitat pollution and sedimentation. It is recommended to provide a marine spatial planning and more effective law enforcement practice in the area to effectively put up a dugong conservation program.

### Review of the aquatic riffle beetle Genus *Graphelmis*, DELÈVE, 1968 (Insecta: Coleoptera: Elmidae) in the Philippines

**Ninez Bernardine L. Manaloto** and Hendrik Freitag

*Ateneo de Manila University*

Delève erected the genus *Graphelmis* for medium-sized Oriental Riffle Beetles in 1968. Four endemic species are currently recognized in the Philippines. Based on museum specimens and university collections, we update the *Graphelmis* species distribution in the Philippines as follows: *G. palawanensis*: further records from Palawan; *G. elisabethjaechae*: Laguna, Zambales and Camarines Sur; *G. schoedli*: several new records exclusively from Mindoro; and *G. dembickyi* was further recorded from Aurora and Camarines Sur in Luzon, Mindoro. Additionally, five new species were recorded from the following islands: *Graphelmis* sp. A: Samar; *Graphelmis* sp. B: Siargao; *Graphelmis* sp. C: Mindanao; *Graphelmis* sp. D. & E: Palawan and Busuanga. Aside from the discovery of five new species in the Philippines as a contribution to mapping the biodiversity in the country, the endemicity status of *Graphelmis palawanensis* in Palawan, *G. schoedli* in Mindoro, *G. elisabethjaechae* in Luzon could be confirmed. This research concludes that 1) various species groups of *Graphelmis* have reached the Philippine islands by dispersal via the Palawan Corridor; 2) the available DNA sequences mainly confirmed the morphological species/species group concept; 3) the island endemism status in Philippine elmid water beetles is elevated; 4) elmid fauna especially in the Visayas and Mindanao are still insufficiently studied; and 5) several, if not all, Philippine *Graphelmis* species might have value as bioindicators, since they appear to be restricted to undisturbed lotic habitats.

# Oral Presentations

### Review of the taxonomic status and distribution of Genus *Caenis* Stephens (Insecta, Ephemeroptera, Caenidae) in the Philippines

**Jhoana Garces** and Hendrik Freitag

*Ateneo de Manila University*

Numerous systems for monitoring environmental changes in running waters and streams have been established using mayflies (Ephemeroptera) as short- and long-term bioindicators in Europe, but little is known about the status of this order in the Philippines. Studies in freshwater ecology and bioindicators are highly dependent on accurate identification and discrimination of species, hence it is necessary to confirm the diversity and distribution of this semi-aquatic insect group in the country. The genus *Caenis* Stephens, 1835 has 29 described species in the Oriental Region, four of which are currently noted in the Philippines: *Caenis annulata* Navás from North Luzon, *Caenis pumila* Navás from North Luzon, *Caenis philippinensis* Ulmer from Southern Luzon, and *Caenis nigropunctata* (Klapalek) from the Southeast Asia region. *C. pumila* was declared as species inquirenda by Malzacher (2015), while *C. annulata* and *C. philippinensis* need redescription based on new samples from the type locality. *C. nicropunctata* was recently redescribed and its presence in the Philippines has yet to be confirmed. In this contribution, taxonomic status of Philippines *Caenis*, especially in Mindoro island, are examined. Aside from following modern diagnostic criteria for male imagines, additional diagnostic information on the larval taxonomy are provided for Philippine Caenidae, for the first time. Preliminary conclusions on the usefulness as bioindicators are drawn based on their habitat requirements.

### River sediment analysis: basis for rehabilitation of Buayan-Malungon River Basin

**Merry Chrisse C. Kamad**[1], Emma Peralta-Nebran[1], Edward Lapong[2]

[1]*Province of Sarangani–Environmental Conservation and Protection Center*
[2]*Mindanao State University–General Santos City*

Suspended sediment is the most visible pollutant originating from agricultural areas. Likewise, excess sediment is considered as a vivid evidence of human-induced water pollution. In Sarangani province, sediment is viewed as a growing challenge that must be addressed, particularly in sites with high agricultural activity and soil erosion rate. The Buayan River, which borders General Santos City and Sarangani Province in its downstream portion, drains the Buayan-Malungon River Basin that covers Central and Southern Mindanao and which flows out of Sarangani Bay Protected Seascape. As one of the 18 largest rivers in the Philippines and classified as Class SB, this watershed must be conserved and preserved. Permanent sampling stations established in the river pre-determined considering the usage, activities, distance and accessibility. Thus, this study aimed to analyze the sediment of the river basin with a total sediment discharge of 77,391 mg/s or 278,612 kg/hr flowing out Buayan River. The areas were delineated on the map using GIS. Sampling collection for the whole year covered the dry and wet season. Flow rate, sediment discharge, and biophysical characteristics of the river were assessed. The data were analyzed using graphical, mathematical, statistical (descriptive) analysis. Water samples to determine the sediment concentration (total suspended sediments) were collected through manual collection of the samples using a 4-L water container. This study may connect to the occurrence of environmental degradation of resources in Sarangani Bay Protected Seascape and serve as basis for policy formulation for the conservation and protection of the watershed.

# Oral Presentations

### The continuing challenge of crocodiles in the utilitarian perspective of Philippine politics

**Jazztin Jairum P. Manalo**[1] and Rainier I. Manalo[2]

[1]*Faculty of Arts and Letters, Political Science Department, University of Santo Tomas*
[2]*Crocodylus Porosus Philippines, Inc.*

The two species of crocodiles indigenously present in the Philippines, the Philippine Crocodile *Crocodylus mindorensis* and Indo-pacific Crocodile *Crocodylus porosus*, are considered vermin despite their globally threatened status. It is a new common in the Philippines that crocodiles are seen as the representation of greedy government officials, corrupt politicians, and selfish individuals. The need for the reversal of mainstream society's perceived notion on crocodiles as undesirable public figures is imperative for conservation management of the species. Thus, this study aims to document the discernments of Filipinos about crocodile via-a-vis politician for species conservation policy reference. In this paper, we collate data from peer-reviewed manuscripts, news articles, and advertisements that present the pessimistic utilitarian perspective of general public and politicians towards crocodiles. A social media experiment from February to March 2016 on a question "where can you find crocodiles" has generated varied human responses, but majority lean towards the negative connotation. In general, socio-political communities reduced the biological importance of crocodiles into an icon of unethical economic modification aside from conserving the real species. This view impedes the true meaning of crocodile existence and is a continuing hindrance in saving the species for economic benefits in fishery, community-based tourism, and commercial trade. Human and crocodile coexistence is part of Philippine indigenous knowledge system and related best practices could provide potential sustainable revenue. Crafting an environmental policy would be vital to the sustainable conservation of crocodiles in the Philippines.

### The SEABIO consortium for biodiversity research and the latest results from Thailand, Cambodia, Indonesia, and the Philippines

**Hendrik Freitag**

*Ateneo de Manila University*

In 2016, we extended an existing biodiversity research network between the AdMU Department of Biology and German research institutes by the inclusion of further academic institutions from ASEAN counties and the EU. Within the frame of a small international grant led by the AdMU, workshops, trainings, symposia and research visits were organized in Thailand, Germany, Austria, Slovakia and the Philippines. These activities included field sampling, lectures, lab work and paper writing. This young, but fruitful cooperation has led to a number of joint papers (partly published, some submitted, others in preparation), especially in the field of aquatic invertebrate taxonomy. Ten new species of Spider Water Beetles (Insecta: Coleoptera: Elmidae: *Ancyronyx*), plus some of their larvae were described from Sulawesi; a new Riffle Beetle species (Elmidae: *Vietelmis*) was found during the workshop field trip in Thailand; a Long-palped Water Beetle (Coleoptera: Hydraenidae: *Hydraena*) was discovered from Mindanao, along with two new Microvelia bugs (Insecta: Hemiptera: Veliidae). Another new species of the later genus, plus a new Water Needle (Hemiptera: Nepidae: *Ranatra*) were collected by the team from Cambodia. Further aquatic macroinvertebrates that are new to science have been recorded in scope of the SEABIO activities and still await their formal description. All underlying papers focus additionally on an update of the distribution and checklists of the organismic groups on different taxonomic and geographic levels. Ecological information of the taxa is provided if ever possible, along with molecular-genetic barcodes, if COX1 sequences were amplified. We aim to highlight the importance of international collaboration, but will also refer to limitations, and general problems in alpha-taxonomic research.

# Oral Presentations

### Ultraconserved elements clarify the phylogenetic position of Philippine zosteropids

**Carl H. Oliveros**[1], Michael J. Andersen[2], Robert G. Moyle[3]

[1]*Louisiana State University*
[2]*University of New Mexico*
[3]*University of Kansas*

The avian family Zosteropidae (white-eyes) exhibits one of the highest diversification rates known among terrestrial vertebrates. The Philippine archipelago harbors 16 of the 121 recognized species in the family. Previous estimates of their phylogenetic position have been largely unresolved owing to short intervals between lineage splitting events in multiple sections of the Zosteropidae phylogeny. We collected almost 4000 genome-wide DNA sequences from 71 white-eye species through target enrichment of ultraconserved elements. We employed concatenation and coalescent approaches to phylogenetic estimation to obtain a well-resolved phylogeny of white-eyes. Philippine zosteropids of the genera *Dasycrotapha*, *Sterrhoptilus*, and *Zosterornis*, which have been previously classified under the family Timaliidae, represent some of the oldest zosteropids to branch off from the rest of the family. All three Philippine species in the genus *Zosterops* belong to a clade consisting of taxa from East and Southeast Asia and Palau. These results suggest an important role of the Philippine archipelago in white-eye diversification.

### Understanding prey-predator relationship using clay models

**Bonifacio O. Pasion**

*Xishuangbanna Tropical Botanical Garden*

Observing prey-predator relationship is important in understanding trophic levels but requires great survey effort and timing. In this study, we created an artificial caterpillar using clay models to detect incidence of attacks of different natural enemies in a tropical forest landscape and investigated the role of plant community structure (i.e. species richness, composition and density), and the role of forest fragmentation (i.e. patch size, edge distance and canopy openness) on predation intensity. Plant community effects were tested with respect to three vegetation strata: trees, saplings, and herbs. Observed predation was substantially due to ants. Predation rates increased with plant species richness for trees and herbs. Density of saplings, herb cover and herb species composition were important factors for predation. No significant patterns were found for fragmentation parameters, suggesting that forest fragmentation has not altered predation intensity. We conclude that in tropical forests, top–down control of herbivorous insects in the understory vegetation is affected by a combination of plant diversity, plant species composition and structural features of the plant community. More importantly, our result reflects that our method using clay models can be used to observed prey-predator relationship which can be difficult to observe using the traditional method.

# Oral Presentations

### Understorey and sub-canopy to canopy vertebrate fauna in the Mt. Makiling Forest Reserve, Los Baños, Laguna

Juan Carlos T. Gonzalez, **Anna Pauline O. de Guia**,
Judeline C. Dimalibot, Khryss V. Pantua, Whizvir O. Gustilo

*Museum of Natural History, University of the Philippines Los Baños*

We examined the vertical stratification of forest wildlife, from the ground up to the sub-canopy/canopy layer of a 2-hectare permanent plot within the Lowland Evergreen Forest. Our aim was to determine the species richness of the rainforest and its associated layers, and evaluate the importance of their ecosystems services. Understorey sampling was conducted in July 2016 following standard protocols including purposive sampling for amphibians and reptiles, ground netting for avifauna and bats and, trapping for non-volant mammals. Sub-canopy to canopy sampling was conducted in April 2017 within selected large trees. Amphibians and reptiles were recorded through purposive sampling within trunks and branches. Mist nets and harp traps were set between trees within the sub-canopy while cage traps were set onto tree branches. Our preliminary results suggest that species richness for birds, bats and non-volant mammals increases the higher the forest strata. However, for frogs, lizards and snakes, species richness decreases the higher the forest strata.

### Utilization of Facebook to trade live reptiles in the Philippines

**Emerson Y. Sy**

*Philippine Center for Terrestrial and Aquatic Research*

The trade in live reptiles as pets has increased exponentially in the last three decades with Asian countries playing an increasing role as important trade hubs and consumers. In the Philippines, physical markets were traditionally the main source of live reptiles, but illegal wildlife traders displaced by enforcement actions have increasingly turned to online platforms, such as Facebook, to continue their illicit trading activities. Recognising the increasing importance of Facebook in live reptile trade, TRAFFIC researchers conducted a three-month survey from June to August 2016 to elucidate current trade dynamics, analyse trends, and identify areas for future work. A total of 2245 unique advertisements representing 115 reptile taxa and a minimum of 5082 individuals were posted by 1046 users in the 90 pre-selected Facebook groups. The estimated potential value of all advertised reptiles recorded during this study was PHP 26 451 345 (USD 570 148). Fifty two percent of taxa available in the trade were internationally regulated by CITES. The availability of non-native species without legal importation records suggests smugglers exploited loopholes in the implementation of Philippine customs rules and regulations. The trade also directly threatens native and endemic reptiles due to unabated wildlife poaching from all over the country. Thirty four percent of traded taxa was indigenous and practically all specimens were illegally collected from the wild. Based on current Philippine wildlife law and regulations, at least 80% of online traders was deemed involved, knowingly or otherwise, in illegal trading activities.

# Oral Presentations

### What drives palm community structure and diversity on Samar Island, Philippines?

**Jiro T. Adorador**[1] and Edwino S. Fernando[2]

[2]*Plant Biology Division, Institute of Biological Sciences, University of the Philippines Los Baños*
[2]*Forest Biological Sciences, College of Forestry and Natural Resources, University of the Philippines Los Baños*

An ecological study of palms (Arecaceae) on Samar Island was conducted to determine the drivers of community structure and diversity of this economically and ecologically important plant group. Fieldwork was carried out from February to March 2016. Thirty-six 20 m × 20 m nested plots were established across three different forest formations (lowland evergreen forests [LEF], forests over limestone [FOL], and forests over ultramafic rocks [FOUR]) to take account of all growth forms and growth stages of palms (erect and climbing; seedling, sapling, and mature) and to collect environmental (light, edaphic, topographic, and vegetation structure) and geographical (XY coordinates) data. Response variables (palm community composition based on diversity [DIV], abundance [ABU], and presence/absence [PRAB]) were separately examined with each of the predictor variables (environmental and geographical) using simple and partial Mantel tests across (n=36) and each of (n=12) the three forest formations. A total of 4,740 palm individuals, representing 39 species (15 erect and 24 climbing; 49% seedlings, 31% saplings, and 20% mature) were inventoried. As predicted, DIV scored the highest among LEF plots, followed by FOUR then FOL. Meanwhile, ABU and PRAB segregate per forest type but is eventually driven by local environment conditions. In general, all-palm and rattan communities are more "niche-based" while erect palm communities are more "dispersal-based". The relative influences of light, soil, topography, and vegetation structure on palm community composition considerably differ with their growth form, current growth stage, and respective habitats. These ecological trends shall be utilized for scientifically-sound conservation strategies of palms and their habitats on the island.

# List of Titles
# Poster Presentations

## High School



## Undergraduate

# List of Titles
# Poster Presentations

# List of Titles
# Poster Presentations

# List of Titles
# Poster Presentations



## Regular

# Poster Presentations

# HIGH SCHOOL
# Poster Presentations

### Diversity of volant fauna in Masungi Georeserve — a newly established karst ecotourism site

**Mijon Anne C. Tangye**, Mariah Jose A. Dichoso, Kyla Clairray L. Cortez, Hannah Angela G. Dy, Jhulia Maria C. Sta. Maria, Rieziel Ann Bernal[1], Maria Josefa S. Veluz[2], Henry G. Calilung

*Holistic Education and Development Center*
*[1]Philippine Science High School – Main Campus*
*[2]National Museum of the Philippines*

Masungi Georeserve is a conservation area with a unique limestone landscape. To determine bird and bat diversity, we set up 17 mist nets in a 300-hectare karst forest. Five-point count stations were established for birds. A total of 85 net-nights resulted in eight bird species and six bat species. We compared our data to two similar studies done in limestone areas in Sarawak, Malaysia. Masungi had a higher bird endemicity rate (50% versus 3%). Likewise, Masungi had a higher species per unit area (8 versus 3). One charismatic bird species we documented in Masungi was the *Otus megalotis*. Though classified as Least Concern by IUCN, its presence in Masungi, along with three other endemics, proves that Masungi is indeed worth preserving. We used Shannon's index to compare the bat diversity of Masungi with that of Sarawak. At 0.999, the index for Masungi is higher than Sarawak's 0.63. This means that Masungi's bats have a higher level of evenness and hence is more diverse. Two out of the six Masungi bats are endemic while Sarawak had none. These points of comparison allow us to highlight the value of Masungi in bat conservation. The bat species we caught are common but we have two new records for Masungi, *Macroglossus minimus* and *Rhinolophus virgo*. Our species richness is very low compared to other studies on bats, so more netting nights with harp traps is warranted in order to get a better picture of Masungi's bat diversity.

### Ethnobotanical and phytochemical study of the medicinal plants used by the Ayta Negrito indigenous group in Sitio Kanawan, Morong, Bataan

**Nicolas Czar Basilio Antonio** and Reneir John G. Tuason

*Philippine Science High Schcool – Central Luzon Campus*

This study systematically documented and evaluated the medicinal plants used by the Magbukún Ayta Negrito indigenous group in Sitio Kanawan, Morong, Bataan through quantitative ethnobotanical methods and phytochemical screening. Semi-structured interviews were used to gather informant data from 35 informants. Botanical specimens mentioned by the informants were collected and sent to the Jose Vera Memorial Herbarium (PUH) for identity verification and speciation. The World Health Organization (WHO) use category of each botanical specimen was determined. The number of use report for each botanical specimen was also be recorded and tabulated. For further analysis of informant data, quantitative ethnobotanical indices, i.e. use value (UV), fidelity level (FL), and informant consensus factor (ICF), were computed. Five plants were subjected to phytochemical screening for bioactive compounds. The therapeutic uses of 61 plant taxa were documented against 12 categories of ailments. The plant taxon with the highest use value was found to be *Psidium guajava*. The category with the highest ICF was determined to be Category II (Neoplasms). Of the plants screened for phytochemicals, Katuod, Hawili, Mirasol, Lunas Bundok, and Darita all tested positive for sterols, flavonoids, glycosides, and tannins; while Katuod and Darita tested positive for saponins. This study highlights the rich tradition in ethnomedicinal knowledge of the Ayta Negrito indigenous group although results also imply that knowledge is eroding. Nevertheless, this study opens up various avenues in pharmacological research and pharmacogsony.

# HIGH SCHOOL
# Poster Presentations

### Evaluation of secondary school students' awareness in taxonomy education: a pre-requisite for learning and understanding biodiversity at young ages

**Ivan Gabrielle C. Alzula**, Clarence Gio S. Almoite, Jezelle Angeline O. Soriano, Melissa Mae M. Vergel, Rey John D. Caballero

*Ramon Magsaysay (Cubao) High School*

Basic knowledge about taxonomy has been targeted as a fundamental aspect for learning and understanding biodiversity. However, because of its complexity, students abhor this field. Thus, there is a need to determine the students' awareness in order to develop teaching strategies that will help them expand their knowledge in species identification. This study evaluated the awareness of randomly selected secondary public school students in the field of taxonomy. The results revealed that out of 100 students, 78% have an idea about taxonomy while 22% are clueless about it. Moreover, from the 78% respondents, only 3% can accurately define this field. Based on the survey, most of the students learned the basics of identifying organisms from Grade 8 (61%), followed by Grade 7 (44%). 43% of the students have no idea about the species under Kingdom Monera (43%) followed by Protista (26%) while species under Kingdom Plantae are most familiar to the students. This study also revealed that most of the students can identify organisms by their common name (78%) followed by their scientific name (12%) while the rest have no idea about their identification. Aside from school, social media has a great impact for the students to learn and understand taxonomy, wherein 82% of the students answered that they gained knowledge of species identification from the internet while the rest came from science magazines and television shows. The use of taxonomic models (72%) and field tours (67%) as teaching strategies may provide successful learning environments for secondary school students.

### Rapid assessment of Masungi Georeserve herpetofauna

**Jowb Czechariah S. Borja**, Franco Martin C. Gaite, Collin M. Panlilio, Diego Gabrielle R. Abaya, Mathew Nicholas G. Alcantara, Juan Rodrigo T. Gutang, Nikki Dyanne C. Realubit

*Holistic Education and Development Center*

The Philippines is rich in herpetofauna with not only a high diversity (359 species) but also exhibits high endemism (~70%). Masungi Georeserve is a 1500+ hectare forest over limestone area with a history of illegal logging and quarrying activities. This study focuses on herpetofauna species that can be found in the area after roughly 10 years of active protection, to provide an insight to how the area can be optimally conserved. A total of 21 10 x 100 m transects, covering five different sites (ecotourism trail, two rivers, two beside the road transects) in the area were surveyed. During the survey, a total of eight amphibian and five reptile species were encountered. Majority of the species we found were endemic to the Philippines, and some species are considered threatened (IUCN Near Threatened to Vulnerable). Based on these results, the Masungi rivers and forest seem to be environmentally healthy to support sensitive species of frogs like *Limnonectes macrocephalus*. The species *Kaloula kalingensis* however caught our attention mainly because in other areas they usually live in tree holes. However, most individuals that we found were in limestone rock crevices, indicating a new preferred habitat. The charismatic snake species *Trimeresurus flavomaculatus* and *Dendrelaphis philippinensis* was also found near the trails. Important species that raise concern is *Rhinella marina*, which has been proven to be an invasive species. Currently, Masungi Georeserve seems to be adequately protected but it is ideal to stop removal of leaf litter and reduce application of chlorine from the trails.

# HIGH SCHOOL
# Poster Presentations

### Temporal and spatial variation in species diversity of spiders (Araneae) in Masungi Georeserve

**Anjela Lu B. Arellano**, Alyanna Sharyce D. Aparilla, Mark Zoren B. Valmonte, Christian Jai C. Garcia, Romar A. Lintag, Nikki Dyanne C. Realubit

*Holistic Education and Development Center*

SPIDERS EAT INSECTS, aid in decomposition, and are a valuable food source for many small mammals, birds, and fish. Opportunistic sampling for spiders was done in three different sites of varying levels of disturbance from 8:30–11:30 am and 5:30–8:30 pm within the Masungi Georeserve. Each site was visited three times in the morning and in the evening. Thirteen families of spiders were identified to morphospecies level. The diversity and abundance of spiders caught in the evening were higher than in the morning. Araneidae made up 50.88% of the total morphospecies caught. Larger numbers of Araneidae was caught at night, which may be because of more predators during the day. Site B (cave) had the most diversity compared to site A and C (both forests). Site B is slightly disturbed due to artificial light and scented candles. Site A is very disturbed because of tourist traffic. Site C, on the other hand, is rarely visited. When compared with a similar study in Polillo Islands, Masungi has a higher diversity of spiders inside the cave, but Polillo Islands has a higher diversity of spiders in the forest. We recommend adding more sites, and more days because our species accumulation curve still shows an increasing trend. To lessen impact, Masungi Georeserve management should remove the artificial light and scented candles in their caves to better conserve its cave spider diversity, as well as avoid the destruction of spider webs.

# UNDERGRADUATE
# Poster Presentations

### A molecular analysis of the phylogenetic placement of *Nepenthes barcelonae* within the Insignes clade using matK and ITS regions and the deviation of a *Nepenthes ventricosa* from Mt. Mingan

**Rod Michael R. Alenton**, Patricia Louise A. Andaya, Kimberly DS. Astrero, Gerald Manuel T. Penaflor, Richard Thomas B. Pavia Jr., Grecebio Jonathan D. Alejandro

*Department of Biological Sciences, College of Science, University of Santo Tomas*

*Nepenthes barcelonae* is a recently described species of pitcher plant found only in Mt. Mingan, Aurora. This study explored the utility of maturaseK (matK) and nuclear internal transcribed spacer (ITS) regions as a source of similarity in evaluating phylogenetic relatedness between *N. barcelonae* and members of the Insignes clade. Sequences of numerous *Nepenthes* members and outliers *Ancistrocladus abbreviatus* and *Tryphyophyllum peltatum* were also obtained from Genbank to accomplish the objective. Molecular data analysis supported the morphologically-established phylogenetic relationship among the given samples. Furthermore, a sequenced sympatric *Nepenthes ventricosa* specimen contained gene sequences more closely resembling *Nepenthes alata* of the Vulgatae clade than current Genbank *Nepenthes ventricosa* sequences, raising interest in the possible occurrence of hybridization on Mt. Mingan between sympatric species: *Nepenthes barcelonae*, *Nepenthes ventricosa*, and *Nepenthes alata*, as well as the possibility of *Nepenthes barcelonae* being a product of hybridization.

### A timeline and spatial trend review of selected aquatic invasive alien species (IAS) in the Philippines

**Mica Xiena Yungca**[1] and Jonathan Carlo A. Briones[1,2]

[1]*Department of Biological Sciences, College of Science, University of Santo Tomas*
[2]*Research Center for the Natural and Applied Sciences, University of Santo Tomas*

Aquatic invasive alien species (IAS) pose several challenges not only to the conservation of native biota, but also to the sustainability of farming and fishing industries. Herein, we review information on selected Philippine aquatic IAS by highlighting the timeline and spatial trends of research within this field in the country, in comparison to updates from databases in public domain (Global Invasive Species Database and Invasive Species Compendium). Information on the origin, local distribution, conservation status, and reason for introductions of IAS were compiled and were contrasted with existing Philippine policies and programs. Results show that although laws and guidelines have been set, there is much room for legislation and implementation for the assessment and intervention of introduced species that have been marked as IAS. To end, this review looks at already known information at a different light in order to recommend tangible steps to tackle gaps on Philippine aquatic IAS research.

# UNDERGRADUATE
# Poster Presentations

### Amphibian diversity and distribution across a habitat gradient in the northern section of Central Panay Mountains, Antique, Panay Island

**Felix Benedict M. Fabunan**[1], Lisa Marie J. Paguntalan[2], Dennis A. Warguez[1], Cesar G. Demayo[1], Erl Pfian T. Maglangit[2], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*

A SURVEY TO DETERMINE the diversity and distribution of frogs across different habitat gradients in the northern section of Central Panay Mountains (CPM) was conducted from July 25 to August 9, 2016 using Line Transect Method. A total of 76 100-m transect lines were surveyed and a total of 228 10 x 10 m quadrats were selected for habitat assessment. In total, 301 individuals belonging to 11 species of frogs were recorded in CPM, six of which are Philippine endemic. *Platymantis cf. panayensis* is Endangered while *Limnonectes visayanus* and *Platymantis cf. guentheri* are classified as Vulnerable. *Platymantis cf. guentheri* was found to be a new island distribution record in Panay. *Occidozyga laevis* was the only species observed to occur in all three habitat types, namely, lowland primary forest, lowland secondary forest and karst limestone forest, while *Platymantis dorsalis* was the most abundant species (RA=33.22%). All three habitat types support a moderate diversity with lowland primary forest with the highest diversity (H'=1.506). Logistic Regression Analysis showed that the abundance of *Limnonectes visayanus* was highly correlated to areas with increased fern vegetation and lower understory cover while *Fejervarya moodiei* will likely be abundant in areas with high percentage of canopy cover, shrubs, ferns, low leaf litter cover density, lower soil temperatures and lower elevation. Lastly, *Occidozyga laevis* has an increased likelihood to occur in lower elevations, lower water pH, and lower air temperature. The presence of endangered and endemic species proves that there is a need to declare Central Panay Mountains as a protected area immediately.

### Assessment of metazoan parasites among commercially important species of Balistidae

Marianne R. Abuan and **Amanda Gabrielle DC. Garcia**

*University of Santo Tomas, College of Science*

FISHES ARE IMPORTANT TO HUMAN POPULATION in terms of food and industry. The quality and quantity of fish and fish products is directly affected by the presence of parasites. This study aimed to identify and assess the prevalence, mean intensity and mean abundance of parasites on four commonly traded ornamental species of fish under the family Balistidae. A total of 88 fish samples, consisting of 4 species under Balistidae family were procured; 40 Gilded or Blue Throat Triggerfish (*Xanthichthys auromargitus*), 20 Pinktail Triggerfish (*Melichthys vidua*), 17 White-Banded Triggerfish (*Rhinecanthus aculeatus*), and 11 Black Belly Triggerfish (*Rhinecanthus verrucosus*) were investigated for the presence of metazoan parasites. Parasite species found were isolated from the gills and gastrointestinal tract of the fish. The study detected three parasite taxa among the triggerfishes which include the nematodes (8), trematodes (6), and copepods (2). Moreover, these parasites were examined under compound microscope and were identified up to the lowest taxonomic level. The nematode, two digenean trematodes, copepod were identified as Anisakidae gen. sp., *Paracryptogonimus orientalis*, *Paracryptogonimus acanthostomus*, and *Cirracanthus monacanthi*, respectively. The overall prevalence of the parasitic infection on the Balistidae family is 11.36%. Among the 88 fishes examined, 10 triggerfishes were found to be infected with parasites. The fish sample with the highest infection rate was *Xanthichthys auromargitus*. This study also shows that there is no significant correlation between parasite infection and length of the host sample as well as the prevalence among the length of the fishes.

# UNDERGRADUATE
# Poster Presentations

### Cytotoxic efficacy of *Crocodylus porosus* crude blood plasma against breast cancer cells in vitro and its plasma and serum protein profile

Raven Loise V. Borres, Jan Chester Z. Chan,
**Ivy Beatrice M. Cruz**, Jan Paolo Z. Racelis, Mae Lowe L. Diesmos

*University of Santo Tomas*

*Crocodylus porosus* (Saltwater crocodile) is considered to be the largest and most widely distributed of the living crocodilians. Generally, crocodilian blood plasma has been proven to have anti-microbial, antioxidant, anti-inflammatory and wound healing properties. This study aims to obtain crude blood plasma from *C. porosus* and be able to find potential leads that can contribute to current studies regarding its potential as a cure for cancer. The study also aims to obtain its plasma and serum protein profile. Crude blood plasma of the *C. porosus* was obtained wherein its optimum % cell inhibitory concentration and IC50 were determined using Yellow Tetrazolium Bromide Assay. Sodium dodecyl sulfate polyacrylamide gel electrophoresis was also performed to obtain its plasma and serum protein profile. Different concentrations of crude crocodile blood plasma (250, 125, 62.5, 31.25 and 15.63 µg/mL) exhibited breast cancer cell inhibition by 23.18%±0.63%, 43.93%±0.57%, 75.81%±1.41%, 78.10%±1.76% and 82.36%±0.16%, respectively. The crude blood plasma however, showed an inverse relationship against the standard in terms of cell inhibitory activity. The researchers were also able to take note of the protein profile of the crude blood serum and plasma containing significant proteins. The study showed that *C. porosus* crude blood plasma has a promising cytotoxic activity over breast cancer cells if administered with the correct concentration and with the recommendation of further studies as well.

### Distribution of Flame-templed Babbler (*Dasycrotapha speciosa*) across a habitat gradient in the northern section of Central Panay Mountains, Panay Island

**Ruth Jeanne J. Degamo**[1], Lisa Marie J. Paguntalan[2], Dennis A. Warguez[1], Cesar G. Demayo[1], Andrew Ross T. Reintar[2], Emelyn S. Peñaranda[3], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*
[3]*Conservation Development Division, Department of Environment and Natural Resources – Region 6*

A study on the distribution and abundance of the endangered Flame-templed babbler (*Dasycrotapha speciosa*) across a habitat gradient was conducted from July 25 to August 9, 2016 in the Central Panay Mountains (CPM), specifically in the municipalities of Sebaste and Culasi, Antique province. A combination of Line Transect Method and Point Count Method was used in the babbler assessment where a total of five transects measuring 7000 meters were surveyed. Also, a total of 88 30 x 30 meter circular plots were established for the habitat assessment. The Flame-templed babbler was recorded in two out of three habitat types—the primary lowland forest and secondary lowland forest. *D. speciosa* was more commonly distributed and abundant in primary lowland forest (n=10) than in secondary lowland forest (n=3). Logistic Regression Analysis showed that increased understory layer height and number of trees with DBH (31–50 cm) were associated with an increased likelihood of species presence while increased bamboo percentage were associated with a decreased likelihood of species presence. Current local threats observed include timber poaching, cutting of long trees for construction purposes, agricultural land conversion and hunting. This study recommends for the conservation and protection of CPM through community- based forest protection, developing conservation awareness and establish the CPM as a protected area through local or national law.

# UNDERGRADUATE
# Poster Presentations

### Diversity and abundance of understory birds in the northern section of Central Panay Mountains, Antique, Philippines

**Kate J. Bullecer**[1], Lisa Marie J. Paguntalan[2], Karyl Marie F. Dagoc[1], Dennis A. Warguez[1], Andrew Ross T. Reintar[2], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*

A STUDY ON THE DIVERSITY AND ABUNDANCE of understory birds was conducted in Central Panay Mountains (CPM) from July 25 to August 9, 2016 using Point Count Transect Method. Five transect lines with a total length of 4,350 m were established in all habitat types and 87 30 x 30 meter circular plots were used for the habitat assessment. A total of 115 bird individuals belonging to 14 bird species were recorded wherein five species are Philippine Endemic: *Dicaeum haematostictum* (Vulnerable), *Copsychus superciliaris* (Data deficient), *Gallicolumba keayi* (Critically endangered), *Rhinomyias albigularis* (Endangered), and *Dasycrotapha speciosa* (Endangered). Shannon-Weiner and Simpson's Diversity Index showed that primary forest had the highest understory bird diversity (H' = 2.038; D = 0.852). Canonical Correspondence Analysis showed that understory layer and bamboo percentage are the most significant variables that influence the abundance of understory birds in the area. Local threats observed include logging of trees, clear-cutting for agricultural purposes and hunting. The gathered information will be used as basis for the declaration of Central Panay Mountains as a protected area.

### Diversity and composition of Class Polyplacophora in selected areas in Island Garden City of Samal, Philippines

Geonyzl L. Alviola, **Karla Faye T. Fueconcillo**, Alfonzo D. Gonzaga, Queennie Angelica L. Labio, Rhea Vanessa Angel Y. Luzon, Zyra Mae P. Surban

*Biology Department, Davao Doctors College*

POLYPLACOPHORA ARE SUBSTRATE DWELLING MOLLUSKS that could be found from intertidal to littoral zone in the marine ecosystem and functions as biological indicator in maintaining ecological balance. This study aimed to determine the diversity and distribution pattern of Polyplacophora in selected areas of Island Garden City of Samal. Four areas were selected namely, Sanipaan Shoal, Brgy. Peñaplata, Brgy. Camudmud and Brgy. Babak. A total of five species belonging to Family Chitonidae were found in Brgy. Camudmud and Brgy. Babak, these were: *Acanthopleura brevispinosa*, *Acanthopleura gaimardi*, *Acanthopleura gemmata*, *Acanthopleura vaillanti*, and *Acanthopleura granulata*. Sanipaan Shoal and Brgy. Peñaplata revealed an absence of Polyplacophorans. Brgy. Camudmud had an evenness rating of 0.8519 while Brgy. Babak has 0.8994 which showed an uneven distribution of Polyplacophorans. The diversity of this group could be due to the type of substrate in the area and its exposure to threats such as predation. Overharvesting of the Polyplacophorans was the greatest threat because these are served as part of the diet in the identified community.

# UNDERGRADUATE
# Poster Presentations

### Diversity and distribution of insectivorous bats in the northern part of Central Panay Mountain, Antique, Philippines

**Joegen P. Sanguenza**[1], Lisa Marie J. Paguntalan[2], Dennis A. Warguez[1], Cesar G. Demayo[1], Emelyn S. Peñaranda[3], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*
[3]*Conservation Development Division, Department of Environment and Natural Resources – Region 6*

A STUDY ON THE DIVERSITY AND DISTRIBUTION of insectivorous bats in two habitat types (lowland primary forest, lowland secondary forest) in the northern part of the Central Panay Mountain (CPM) was conducted from 24 July to 10 August 2016. Standard harp trapping (32 traps nights) and mist netting (92 net nights) methods were employed. For habitat assessment, 124 30 x 30 meter plots were selected. A total of 24 individuals of insectivorous bats were captured belonging to eight species which include two new species records (*Kerivoula hardwickii*, *Murina suilla)* for CPM. Only two species were Philippine endemic, *Rhinolophus inops* and *Hipposideros pygmaeus*. Shannon-Weiner Index showed that the lowland secondary forest habitat type has the highest insect bat diversity than the lowland primary forest (H=1.386). The most abundant species is the Little long-fingered bat, *Miniopterus australis*, with a relative abundance of 54.17%. Logistic Regression Analysis showed that trees with diameter at breast height 31–50 cm (P value = 0.009) and DBH 51–70 cm (P value = 0.003) were significantly related to the occurrence of *Rhinolophus arcuatus* and *Miniopterus australis*. Canonical Correspondence Analysis revealed that higher understory cover, canopy cover, and DBH 31–50 cm significantly affect the abundance of *Kerivoula hardwickii* and *Rhinolophus arcuatus*. The results of this study can provide supplementary baseline data for conservation and management of insect bats in Central Panay Mountain.

### Diversity, abundance and occurrence of canopy birds in the unprotected (non-NIPAS) region of the Mt. Apo Key Biodiversity Areas: a vital key for forest management

**Jeraldine Mae A. Villaruz**[1], Dennis A. Warguez[1], Jayson I. Ibañez[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippine Eagle Foundation*

A STUDY ON THE DIVERSITY, ABUNDANCE AND OCCURRENCE of canopy birds was conducted in the unprotected (non-National Integrated Protected Areas System) region of the Mt. Apo Key Biodiversity Areas, Davao City, Philippines on July 2016. A combination of Point Count Method and Line Transect Method was used to survey the birds in the four sampling sites, namely: Brgy. Carmen, Brgy. Tawan-tawan, and Brgy. Tambobong of Baguio District and Brgy. Salaysay of Marilog District. A total of 32-kilometer transect was established during the entire sampling period. 1,470 individuals belonging to 80 species of canopy birds were recorded, in which 44 species are Philippine endemic. Philippine Eagle (*Pithecophaga jefferyi*), a Critically Endangered species, was recorded in the area. In addition, two species (*Penelopides panini*, *Spizaetus philippensis*) were listed as Endangered, four Vulnerable species (*Hypothymis coelestis*, *Phapitreron cinereiceps*, *Buceros hydrocorax mindanensis*, *Spizaetus philippensis*) and five Near-Threatened species. The most abundant species was *Zosterops montanus*. Statistical analysis showed that the area has a high canopy bird diversity (H'=3.375; 1-D=0.94). Canonical Correspondence Analysis revealed that the abundance of canopy birds is positively correlated with canopy cover, tree DBH, tree height and tree density. Logistic Regression Analysis showed that the occurrence of canopy birds is affected by tree density, tree height, tree DBH and canopy cover. Inclusion of the four barangays in the National Integrated Protected Areas System is highly recommended for the protection and preservation of birds in Mt. Apo

# UNDERGRADUATE
# Poster Presentations

### Diversity, distribution and abundance of lizards in the northern part of Central Panay Mountains (CPM), Panay Island

**Micah Ediessa V. Ong**[1], Lisa Marie J. Paguntalan[2], Dennis A. Warguez[1], Erl Pfian T. Maglangit[2], Emelyn S. Peñaranda[3], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*
[3]*Conservation Development Division, Department of Environment and Natural Resources – Region 6*

The distribution and abundance of lizards were studied in Central Panay Mountains from July 22 to August 9, 2016. A combination of Visual Encounter Survey, Line Transect and Pitfall Trap Methods were used in surveying a total of 76 100-meter transects. A total of 228 10 x 10 meter plots were selected for habitat assessment in the three habitat types: primary forest, secondary forest and karsts forest. Sixty eight individuals belonging to 15 species which constituted into four families: Gekkonidae, Agamidae, Scincidae, and Varanidae. Lizard diversity was highest in the primary forest (H'=1.523). Endemic species of lizards are distributed throughout the different habitat types. Data deficient species were recorded in karst forest while threatened species were observed in the primary forest. The most common and abundant species was *Cyrtodactylus philippinicus* (RA=50%). Logistic Regression Analysis showed that *C. philippinicus* was dependent on heavy tree and buttress density and diameter at breast height 10–30 cm while *P. steerei* showed a positive correlation with moss percentage and tree height > 21 meters. The presence of endemic species in all habitat types supports the need to protect and preserve the forests of Central Panay Mountains.

### Habitat preferences and population estimate of owls in the northern part of Central Panay Mountains, Antique, Philippines

**Ferenz B. Cavalles**[1], Lisa Marie J. Paguntalan[2], Karyl Marie F. Dagoc[1], Dennis A. Warguez[1], Andrew Ross T. Reintar[2], Emelyn S. Peñaranda[3], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*
[3]*Conservation Development Division, Department of Environment and Natural Resources – Region 6*

A study on the abundance, altitudinal distribution, population and habitat requirements of three species of owls — Chocolate Boobook (*Ninox randi*), Luzon Boobook (*Ninox philippensis*) and Negros Scops-owl (*Otus nigrorum*) was conducted in Central Panay Mountains from July 25 to August 8, 2016. A total of 22 nocturnal transect points were spent by using playback method.The same transect points were used in establishing 30 x 30 meter plots for habitat assessment. A total of 30 owls were recorded: 13 Luzon Boobook, nine Chocolate Boobook, and eight Negros Scops-owl. Of the 30 owls, 25 (83%) were recorded in primary forest, with Luzon Boobook as the most numerous followed by Chocolate Boobook. Logistic Regression Analysis showed that only elevation significantly influences the occurrence of Luzon Boobook. Population estimates of the three species of owls were derived fro the first time in Central Panay Mountains. Only few ecological studies have been conducted on threatened and endemic owls in the Philippines such as the Camiguin Boobook and Cebu Boobook. This study is the first ecological study of owls in Panay Island.

# UNDERGRADUATE
# Poster Presentations

### Habitat preferences of cavity-nesting birds in the lowland forests of Central Panay Mountains, Panay Island, Philippines

**Menchie R. Bastida**[1], Lisa Marie J. Paguntalan[2], Karyl Marie F. Dagoc[1], Dennis A. Warguez[1], Andrew Ross T. Reintar[2], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*

An assessment on the habitat preferences of cavity-nesting birds was conducted in the lowland forests of Central Panay Mountains, Antique, using point transect methods. A total of 11 species of cavity-nesting birds were recorded of which eight (73%) are Philippine endemic. Habitat assessment was done using 30 x 30 meter plots established in every 50 meters of the 5-kilometer transect. Primary lowland forest housed the most number of individuals (84.92%) and had the most number of endemic species. The most abundant cavity-nesting bird species in lowland primary forest was the Rufous-headed Hornbill *Rhabdotorrhinus waldeni*, while in secondary lowland forest were Coleto *Sarcops calvus* and Visayan Hornbill *Penelopides panini*. Understory layer height, tree density and standing dead trees were found to be significant factors on the abundance of cavity-nesting birds and an increase in these habitat variables linearly showed an increase in the abundance of cavity-nesting bird species. Forest conversion to farmland was observed to be the greatest threat to cavity-nesting birds and to other wildlife found in the same ecosystem. Generated information in this study will be used as one of the basis for the declaration of CPM as a protected area in order to preserve and protect the cavity-nesting birds especially the globally threatened cavity-nesting birds species.

### Haemosporidian (Apicomplexa) parasite of cave-roosting bats of Calabidongan Cave, Camalig, Albay, Bicol Peninsula, Philippines

**Cyrus Job P. Dela Cruz**[1], Tomirose G. Abrantes[1], Maria Karina Luth Discaya[1], Plebeian B. Medina[2]

[1]*Department of Biology, College of Science, Bicol University*
[2]*Department of Health – Research Institute for Tropical Medicine*

Bats are known as a reservoir host responsible for the high profiled emergence of zoonotic diseases. Also, bats were identified as a host of the diverse genera of malarial parasite (Haemosporidia: Apicomplexa) and this clearly highlights that this taxon is vital amongst all mammals for the adequate study of malarial parasite. Generally, this study was conducted to screen the cave-roosting bats of Calabidongan Cave, Camalig, Albay, Bicol Peninsula for the possibility of haemosporidian infection. Correlation of parasite load and host biometrics (age, sex, forearm length, and body length) and weight and temperature as a sign of pathological effect of the haemosporidian infection was also utilized in the study. A total of 51 bats were captured using mist net representing four species namely *Miniopterus australis*, *Miniopterus schreibersii*, *Rhinolophus arcuatus*, and *Rousettus ampexicaudatus*. Thirty-five bat individuals examined were positive for haemosporidian infection. *Plasmodium* sp. was examined infesting *Rousettus ampexicaudatus* and *Polychromophilus* sp. was examined infesting the species *Miniopterus australis* and *Miniopterus schreibersii* having the highest prevalence among species. Correlation analysis of host age, body length, forearm length shows positive relationship while host sex was determined having negative relationship with the parasite load. The Haemosporidian infection shows no pathological effect in bats. Furthermore, the habit of flying of bats was hypothetically designated as a major factor in suppressing the pathogenicity of the parasite.

# UNDERGRADUATE
# Poster Presentations

### In-vitro cytotoxicity of crude leukocyte extract from *Crocodylus porosus* against breast cancer cells and normal myoblast cells using MTT assay

Christine Danica R. Bitera, **Jamila Anne A. Castillo**, Mikhail Jose C. Gonzales, Julien Angelo H. Jimenez

*Department of Biological Sciences, College of Science, University of Santo Tomas*

Cancer, which is characterized by uncontrolled cell division, is known to be one of the leading causes of mortality in the world. While several treatments are currently being used, the cost and the risk of these treatments are still high. A promising species which shows strong immunity is the crocodile. Several studies have been conducted regarding its leukocytes and its capability to fight bacterial infections. This study aims to find out if the crude leukocyte extract from *Crocodylus porosus* is able to induce apoptosis on breast cancer cells while being non-toxic to normal myoblast cells. The efficacy of the crude leukocyte extract was tested using the MTT assay. Statistical analysis ANOVA, ANCOVA and Pearson correlation analysis were used to describe the cytotoxicity of the crude leukocyte extract against the breast cancer cells and normal myoblast cells. The results of the MTT assay suggest that the crude leukocyte extract inhibits cancer cells in a dose dependent manner. Moreover, the crude leukocyte extract was cytotoxic to the normal myoblast cells but significantly less cytotoxic against breast cancer cells. Caspase 3/7 assay also reveals that there is a presence of Caspase 3/7 activity, suggesting the caspase-dependent apoptosis pathway. DAPI staining also shows the DNA condensation in the apoptotic pathway. In summary, crude leukocyte extract obtained from *Crocodylus porosus* appeared to be cytotoxic against breast cancer cells but is less cytotoxic to normal myoblast cells and the presence of apoptosis was confirmed.

### Knowledge, attitude and perception of indigenous and local communities on Philippine Crocodile (*Crocodylus mindorensis*) in Central Mindanao, Philippines

**Adam C. Camins**, Dennis A. Warguez, Daisy Lou L. Polestico, Mark Anthony G. Torres, Christile O. Echavez, Rainier I. Manalo[1]

*Mindanao State University – Iligan Institute of Technology*
*[1]Crocodylus Porosus Philippines, Inc.*

The cultural narratives on the presence of Philippine crocodiles in the regions of central Mindanao are commonly known only to citizen science. An assessment on the knowledge, attitude and perception of communities on Philippine crocodile was conducted in Ligawasan Marsh, North Cotabato, Muleta River and Pulangi River in Bukidnon and Tubok River, Lanao Del Sur from October 26 to November 3, 2016. A total of 147 respondents were interviewed using structured survey questionnaires. Results showed that all respondents were knowledgeable on the presence of crocodiles in the area, and that seeing them is not a rare occurrence (89%). More than half of the respondents (59%) generally like the crocodiles, and believe that there is a need for their conservation. Majority of the respondents (85%) believe that the mere presence of crocodiles has potential for eco-tourism. They (65%) perceived that crocodiles do not pose a threat to the lives of residents nor do affect their livelihood. Mythical beliefs of the majority of ethnic groups play an important role in protecting the crocodiles in the area. Their positive attitude toward crocodile conservation was agreed by only 35% of the Cebuano/Bisaya respondents. Moreover, protections of crocodile's habitats were the common consensus on all of the ethnic groups. This study strongly recommends the need for the establishment of crocodile sanctuaries or local conservation area in communities with positive attitude and perception towards the crocodile. Educational awareness campaign on local communities must be conducted so that the Philippine crocodile will be perpetuated and conserved.

# UNDERGRADUATE
# Poster Presentations

### Knowledge, attitude, and perception of local fishing communities toward Indo-Pacific Crocodile (*Crocodylus porosus*) in Caraga Region, Mindanao, Philippines

**Samantha Nicole Y. Dizon**, Dennis A. Warguez, Daisy Lou L. Polestico, Mark Anthony G. Torres, Christile O. Echavez, Rainier I. Manalo[1]

*Mindanao State University – Iligan Institute of Technology*
*[1]Crocodylus Porosus Philippines, Inc.*

The understudied population of Indo-pacific crocodile (*Crocodylus porosus*) in Caraga region sparks the curiosity on the possibility of coexistence with human. This study was conducted in three municipalities of Agusan Del Sur and Siargao Island from October 24 to November 3, 2016. Structured survey questionnaire was used for gathering knowledge, attitude and perception of fishing communities on crocodiles. A total of 190 respondents were interviewed from the different fishing communities in Caraga Region. Results showed that majority of the respondents (97%) are knowledgeable on the territoriality presence of crocodiles in their fishing grounds. The frequent appearance of this apex predator has subdued disagreement and antagonistic view in many of the respondents (71%). Hence, conservation support for the species was compromised (50%). Although a little more than half of the respondents (53%) believed the need for the protection of declining *Crocodylus porosus* population, the local communities have the ownership in doing so. A reasonable percentage of individuals recognize that the crocodiles do not pose a threat to the lives of the people in the area (43%) nor a disturbance to their livelihood (52%). The varying mode of livelihood from backyard livestock farming to retailed merchandising in these fishing communities somehow translated into socio-economic diversification. This study strongly considers the establishment of Critical Habitat for Indo-pacific crocodiles that would help crocodile to exhibit its ecological importance as drivers of increasing fish productivity. Strengthening the effective conduct of educational awareness on local communities helps the *Crocodylus porosus* population be fully understood and protected.

### Microhabitats of herpetofauna in the lowland forests of Central Panay Mountains, Panay Island

**Flourence Ray B. Bess**[1], Lisa Marie J. Paguntalan[2], Dennis A. Warguez[1], Cesar G. Demayo[1], Erl Pfian T. Maglangit[2], Philip Godfrey P. Jakosalem[2]

*[1]Mindanao State University – Iligan Institute of Technology*
*[2]Philippines Biodiversity Conservation Foundation, Inc.*

A survey on the microhabitats of herpetofauna in the lowland forests of Central Panay Mountains, Panay Island was conducted on July 25 to August 9, 2016 using Line Transect Method, Visual Encounter Survey and Pitfall trapping. Three habitat types were surveyed: lowland primary, lowland secondary, and karst forests. A total of 67 transect lines were surveyed and 228 10 m x 10 m quadrats were established for habitat assessment. A total of 37 species were recorded, 25 of which are Philippine endemic. Four species are categorized as vulnerable: *Limnonectes visayanus*, *Python reticulatus*, *Pseudogekko brevipes*, *Cuora amboinensis*. Amphibians are abundant in lowland primary forest with 10 species while reptiles are abundant in lowland secondary forest with 27 species. 64% of the amphibians prefers aquatic microhabitat, 29% are terrestrial and 7% are arboreal. For snakes, 40% are terrestrial, 33% are arboreal, and 27% are aquatic. For lizards, 45% are both terrestrial and arboreal while only 10% of lizards are aquatic. The herpetofauna have a positive correlation to habitat variables such as fallen logs, buttress roots, leaf litters, clay loam soil, sandy rocks, stream rocks, boulder rocks, high tree densities with DBH of 31–70 cm and tree height of 10–15 m or >21 m. Herpetofauna in lowland forests are abundant and highly endemic, thus it strongly recommends for the declaration of CPM as critical habitat. This study contributes to the efforts of establishing CPM as protected habitat by providing baseline data for the microhabitats of herpetofauna.

# UNDERGRADUATE
# Poster Presentations

### Molecular phylogeny of selected Philippine *Ophiorrhiza* L. (Ophiorrhizeae-Rubiaceae) including two new endemic species

Christian Alvin T. Arca[1], Ana Maria Rosella D. Carreon[1], Ricardo T. Jalipa III[1], **Neil Joseph T. Lee**[1], Niña Kathryn G. Alfeche[2,3], Grecebio Jonathan D. Alejandro[1, 2,3]

[1]*Department of Biological Sciences, College of Science, University of Santo Tomas*
[2]*Research Center for Natural and Applied Sciences, University of Santo Tomas*
[3]*The Graduate School, University of Santo Tomas*

*Ophiorrhiza* L. has a high endemicity in the Philippines with 29 out of 31 species found only in the country. The genus is characterized by its serpentine-like roots, helicoid cyme inflorescences and rhomboidal fruits. However, the large number of its members and the high species morphological variability and homogeneity creates confusion especially in species identification and relationship. To reconstruct their phylogeny, samples collected from Northern Samar, Quezon, Aurora and Davao were subjected to morphological analysis and molecular analysis following Maximum Likelihood and Bayesian inference of combined ITS, rbcL and rps16 datasets. Results showed the monophyly of included *Ophiorrhiza* samples with moderate support (PP=0.93) which was grouped into two subclades. Species having caducous stipules, axillary inflorescences, and glabrous stems composed Subclade A (PP=0.92) while Subclade B (PP=0.92) composed of species having pubescent stems, terminal inflorescence, and persistent stipules. Two new species are also hereby proposed, *Ophiorrhiza erythropilorum* sp. nov. and *Ophiorrhiza hamiguitanensis* sp. nov. The former is closely related to *Ophiorrhiza involucrata* and *Ophiorrhiza ciliata* and is characterized by its involucral bracts, striking red-violet hair pubescence and presence of hairs in the corolla tube and the latter is also allied to *Ophiorrhiza oblongifolia*, *Ophiorrhiza stenophylla* and *Ophiorrhiza linearifolia* and is distinguishable by its highly coriaceous, narrowly lanceolate, glabrous, and attenuate leaves.

### *Mycobacterium* sp. and *Chlamydia* sp. infection in a rescued juvenile reticulated python (*Malayopython reticulatus*)

**Carina R. Llaneta**[1], Emilia Lastica-Ternura[2], Remil L. Galay[3], Maria Epifania Suzanneth G. Lola[3]

[1]*University of the Philippines Los Baños*
[2]*Department of Veterinary Clinical Sciences, College of Veterinary Medicine, University of the Philippines Los Baños*
[3]*Department of Paraclinical Sciences, College of Veterinary Medicine, University of the Philippines Los Baños*

Stress and maladaptation is a special challenge in reptile conservation, wherein wild-caught reptiles are unable to adapt or respond in a captive environment, resulting to the disturbance in homeostasis, chronic stress and immunosuppression, predisposing them to infectious agents and other opportunistic pathogens. A rescued juvenile reticulated python in captivity was diagnosed with mycobacteriosis and chlamydiasis after being presented for necropsy, with notable clinical signs of emaciation, cheesy granulomatous lesions on the mouth and scale rot on the upper third of its ventrum. Gross lesions revealed pinhead, diffused, 1–2 mm yellow to gray raised grainy nodules in the lungs and liver; and yellow to brownish pericardial effusion. Organ impression smears revealed rare to abundant gram positive, gram variable and gram negative bacilli and rods and histopathological findings were strongly suggestive of granulomatous pneumonia, granulomatous hepatitis, cardiomyositis with mild hyalinization and severe nephrosis. Demonstration of acid fast bacilli and histiocytes were also noted in the lungs under Kinyoun stain and Periodic acid-Schiff stain, respectively. Polymerase chain reaction testing for mycobacterial 16S rRNA gene and chlamydial 23S rRNA gene from DNA extraction of affected organs revealed positive results for both genes. Stress prevention in rescued wild-caught animals through good handling and management is important to restore and release them in their natural habitat without contracting and spreading infectious diseases in the wild, which can be a threat within the animal population, and also a public health hazard.

# UNDERGRADUATE
# Poster Presentations

### New delimitations in the tribe Urophylleae (Rubiaceae) inferred from nrDNA and cpDNA gene regions and phytochemical profiling of *Greeniopsis multiflora* Merr.

**Jose Paolo A. Diño**, Khristine D. Bonifacio, Roncel Ivan A. Nicolas,
Nikki Marian A. De Jesus, Grecebio Jonathan D. Alejandro

*University of Santo Tomas*

Urophylleae is a tribe belonging to family Rubiaceae where many of the inclusive genera are poorly circumscribed and unsupported by molecular data; thus, presenting a challenge in the identification and phylogenetic relationships of its members. In this study, Urophylleae samples collected from Mt. Boboyaon, Palapag, Northern Samar, Philippines, were morphologically analyzed and subsequently sequenced using the gene regions ITS, rps16, and trnT-F. In addition, collected leaf samples of *Greeniopsis multiflora* were subjected to phytochemical analysis. The inclusion of Philippine Urophylleae representatives in our Bayesian analysis suggests that genera nested within *Urophyllum sensu lato* (s.l.) require revisions on their generic boundaries. The two Sri Lankan *Urophyllum* species (*U. ceylanicum* and *U. ellipticum*) are resolved as sister to the remaining *Urophyllum s.l.*, and the close relationship of *Pleiocarpidia kinabaluensis*, *Urophyllum lanaense* and *U. leucophlaeum* was resolved in our analysis as sister to the rest of included species of *Praravinia*, *Pravinaria* and *Urophyllum*. For now, we favor to resurrect the genus *Axanthes* Blume which is the former circumscription of the two Sri Lankan *Urophyllum* species, to recognize *Antherostele* as a segregate genus, and proposed U*rophyllum sensu stricto* (s.str.) to only include the genera *Pleiocarpidia*, *Pravinaria* and *Praravinia*. Moreover, the phytochemical profiling of *Greeniopsis multiflora* revealed that phenolic compounds, coumarins, terpenes, essential oils, steroids, and flavonoids are present in the species, which have the potential to be important both commercially and medicinally.

### Preliminary inventory of terrestrial gastropods along the eastern slope of Mt. Malinao, Albay, Philippines

**Mary Rose S. Juan**[1], Ace Kevin S. Amarga[2], Jake Wilson B. Binaday, Emmanuel Ryan C. de Chavez[3]

[1]*Department of Biology, College of Science, Bicol University*
[2]*Institute of Weed Science, Entomology, and Plant Pathology, College of Agriculture and Food Science, UPLB*
[3]*Animal Biology Division, Institute of Biological Science, University of the Philippines Los Baños*

The volcanic mountains of Bicol Peninsula houses the remaining intact forests of the region. Among these volcanic mountains is Mt. Malinao in Albay province. It is home to a diverse assemblage of invertebrate species, including terrestrial gastropods. Yet, little is known about the diversity of these mollusks in the region. A preliminary inventory of terrestrial snails in the eastern slope of Mt. Malinao was conducted between low- and mid-elevation sites. A total of 16 species were accounted belonging to the genera *Calocochlia*, *Cyclophorus*, *Helicostyla*, *Hemiglypta*, *Hemitrichiella*, *Moulinsia*, *Ryssota*, *Sulfurina* representing the families Bradybaenidae, Cyclophoridae, Helicarionidae, Helicidae, Pupinidae, and Trocomorphidae. This report also provides the first geographic distribution record of *Helicostyla amagaensis* for the island of Luzon. It is recommended to conduct further assessment in high elevation sites of the mountain and continually revisit the area to provide a proper documentation of the terrestrial snails of the Mt. Malinao.

# UNDERGRADUATE
# Poster Presentations

### Preliminary report on the assemblage of entomofauna of Batan and Rapu-Rapu Islands, Albay and first documentation of *Aprophata eximia* (Coleoptera: Cerambycidae: Laminiinae) in Southern Luzon

**Ian Lemuel Caldoza**[1], Ace Kevin S. Amarga[1], Ronniel DC. Pedales[2], Ian Kendrich C. Fontanilla[2]

[1]*University of the Philippines Los Baños*
[2]*University of the Philippines Diliman*

Batan and Rapu-Rapu Islands are small islands located east of mainland Albay and politically belong to the municipality of Rapu-Rapu. The vegetation of the islands consists of fragments of secondary forests and vast landscape of agroforest. To date, there is no study concerning the entomofaunal assemblage of these two islands. Herein, we present the first report on the insect fauna of Batan and Rapu-Rapu Islands. Rapid entomofaunal assessment was conducted on April 11 to 15, 2017 using malaise trapping, opportunistic sampling, and sweep netting. A total of 94 insect families representing 12 orders (Blattodea, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Lepidoptera, Mantodea, Neuroptera, Odonata, Orthoptera, Phasmatodea) were documented. Also, this paper reports the first documentation of the Pachyrrhynchus-mimicking longhorn beetle, *Aprophata eximia* (Newman) in Southern Luzon. This Philippine endemic was previously recorded in Northern Luzon (Aurora), Mindanao, and Samar. Furthermore, it is highly recommended to conduct further survey on the islands for additional documentation of its entomofauna and assess its distribution patterns.

### Proposed categories of bycatch based on an assessment of data from the Anilao Fish Port

Estelle Marina Hizon Banzon, **Maria Isabel Ortigas Padilla**, Ronald Allan L. Cruz, Jonathan Patrick H. Yan

*Ateneo de Manila University*

There are various non-specific and ambiguous definitions of bycatch observed in Philippine fisheries, which are also evident in other parts of Southeast Asia. Different fishermen from the country have varying perceptions on what counts as targeted and non-targeted. This has presented difficulties in implementing proper management plans for fisheries and conservation, which can have negative consequences on the population. As such, we aimed to provide a more concrete definition of bycatch based on baseline data obtained from visits to the Anilao Fish Port, Batangas. Through interviews with local fishermen and vendors, and other observations, we were able to identify a total of 35 fish species from 15 families that landed in the port. Seven of these species are considered bycatch to these fishermen. Fifteen of the recorded species have not been evaluated by the IUCN for their conservation status, while four are data deficient. Using gathered responses and data, we created categories of bycatch based on three criteria: whether species are actively targeted or not, whether they are retained or released back into the sea, and whether they are given a market value or given away for free. Bycatch for the fishermen in Anilao Fish Port fall under Category B (not actively targeted, retained, given away for free), which differs from the definition of bycatch from neighboring countries like Indonesia or Thailand. Through these categories, we hope to remedy the lack of a unified definition of bycatch to help improve conservation efforts and fishery management plans.

# UNDERGRADUATE
# Poster Presentations

### Quantitative analysis on habitat requirement of three *Platymantis* species along the lowland forest streams of Central Panay Mountains, Antique

**Hanni Bless A.Linconada**[1], Lisa Marie J. Paguntalan[2], Dennis A. Warguez[1], Cesar G. Demayo[1], Erl Pfian T. Maglangit[2], Emelyn S. Peñaranda[3], Philip Godfrey P. Jakosalem[2]

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Biodiversity Conservation Foundation, Inc.*
[3]*Conservation Development Division, DENR Region 6*

A study on the distribution, abundance and habitat requirements of endemic *Platymantis* frogs along forest streams in the northern section of Central Panay Mountains (CPM) was conducted on July 22 to August 14, 2016. A total of 172 individuals belonging to three species of *Platymantis* were recorded, namely: Common Forest Frog (*Platymantis dorsalis*), Roughed-backed forest frog (*Platymantis corrugatus*), and the vulnerable Guenther's Forest Frog (*Platymantis cf. guentheri*). Thirty-three 100-meter transect lines were surveyed and 99 10 x 10 m quadrats were laid for habitat assessment. *P. dorsalis* was the most abundant species (RA=58%). Logistic Regression Analysis revealed that *P. dorsalis* seems to have an increased likelihood of occurrence due to canopy cover percentage. Meanwhile, *P. corrugatus* has increased likelihood of occurrence with fern percentage. Both species of *Platymantis* frogs oftenly seen on the plant vegetation near the stream banks and sometimes on the rocks. Meanwhile, *P. guentheri* only seen on plant near the stream in the lowland secondary type of forest. Very few studies have been conducted on the ecological requirements of *Platymantis* particularly as this involves all three endemic species.

### Risk of zoonotic pathogen transmission through the Philippine illegal wildlife trade

**Marianne Allison G. Lee,** Vinyl Joseph S. Valeza, Jonathan Patrick H. Yan, Ronald Allan L. Cruz

*Ateneo de Manila University*

Recent studies have described a direct relationship between illegal wildlife trade and the prevalence of zoonotic pathogens in human populations, yet significant consolidated data on common illegally traded wildlife in the Philippines and their associated zoonotic pathogens is lacking. Here, spatio-temporal trends of trade activities, potential pathogen encounter, and the relative risk of exposure to wildlife with zoonotic pathogens were analyzed from January 2010 to June 2016 confiscation data of the DENR-BMB. Through an extensive literature survey, it was found that 49.41% of 170 unique species of traded wildlife harbored zoonotic pathogens that ranged from bacteria, helminths, protozoa, fungi, and viruses. While most pathogens were benign, highly pathogenic *Mycobacterium* species were also found. Most confiscations of these wildlife occurred at Cartimar Shopping Center in Pasay City and in areas of Southern Palawan. Values for potential pathogen encounter reiterated the positive relationship between the diversity of traded wildlife and the encounters that an individual can have with pathogens since wildlife serve as pathogen sinks. An average Relative Risk value of 1.64 established a considerable risk of human contact with wildlife with zoonotic pathogens. Thus, there is clearly a need to regulate trade activities since it is not only detrimental to biodiversity through the overexploitation of species but also facilitates the transmission of zoonotic pathogens that greatly harm public health.

# UNDERGRADUATE
# Poster Presentations

### Survey of mammal assemblage in the montane forest of Mt. Apo using camera trapping method

**Jan Rare R. Betonio**[1], Giovanni Tampos[2], Dennis A. Warguez[1], Jayson I. Ibañez

[1]*Mindanao State University – Iligan Institute of Technology*
[2]*Philippines Eagle Foundation*

Although information on the abundance, occurrence and distribution are essential for conservation actions, standardized field surveys of mammals are difficult to carry out. This study on the composition and abundance of mammals in the montane forest of Sitio Mabanlas, Brgy. Carmen, Baguio District, Davao City in an unprotected (non-NIPAS) Region of the Mt. Apo Key Biodiversity Area, employed a camera trapping technique. Twelve sampling points were selected, from June 21 to August 7, 2016, accumulating 168 camera nights. Twelve 50-meter diameter plots were established for habitat assessment. A total of 134 useful photographs of five species of mammals were recorded. These include five *Paradoxurus hermaphroditus*, 11 *Sus philippensis*, four *Rusa marianna*, two *Macaca fascicularis*, and three unidentified murid individuals. *S. philippensis* has the highest relative abundance of RA=44% with *M. fascicularis* having the least with RA=8%. The montane forest has a moderate species diversity (H=1.433). Conversion of forest area to farms, timber poaching and wildlife hunting poses considerable threats to the forest. It is recommended that additional camera traps be used to detect more mammals and to increase camera efforts. Moreover, longer sampling period and more sampling plots for habitat assessment is needed to gather adequate data for correlation analysis. With most of Mt. Apo KBA remains understudied, information generated from this study is useful for developing management programs in the region. This study provides firsthand information on the species composition and abundance of mammals using camera trapping, the first in Mindanao.

# Poster Presentations

### A survey of mammals in the middle and upper elevations of Mt. Apo, Mindanao, Philippines

**Mariano Roy M. Duya**[1,2], **Jay S. Fidelino**[1,2], Danah Marie P. Purificacion[3], Melizar V. Duya[1,2], Marisol dG. Pedregosa[4], Perry S. Ong[1,2]

[1]*Biodiversity Research Laboratory, Institute of Biology, University of the Philippines Diliman*
[2]*Diliman Science Research Foundation, Inc.*
[3]*Institute of Environmental Science and Meteorology, University of the Philippines Diliman*
[4]*Watershed Management Department, Energy Development Corporation – MAGBU*

Based on field surveys from 1300 to 2500 masl within Mt. Apo in the province of North Cotabato, south-central Mindanao in 2014 and 2017, 27 species of mammals were documented, 24 natives and three non-natives. After 6055 trap-nights and 380 net-nights, a total of 409 small mammals and 354 bats were captured across seven and five sites, respectively. These include eight mice and rats (Muridae), one gymnure (Erinaceidae), two shrews (Soricidae), one squirrel (Sciuridae), one tree shrew (Tupaiidae), seven fruit bats (Pteropodidae), two roundleaf bats (Hipposideridae), two horseshoe bats (Rhinolophidae), and three evening bats (Vespertilionidae). This study adds to the relatively sparse collection of mammalian biodiversity studies in the island of Mindanao, especially compared to the island of Luzon, which has been the focus of intense surveys in the past 20 years. Additional surveys in the lowlands and the highest elevations of Mt. Apo, as well as in other Mindanao peaks, are recommended to better understand the diversification of mammals in Mindanao.

### An initial analysis on micro-distribution patterns and ecological requirements of water bugs (Insecta: Hemiptera: Nepomorpha & Gerromorpha) in Mindoro, Philippines

**Arthien Lovell Pelingen** and Hendrik Freitag

*Ateneo de Manila University*

In mid-1990s, the Philippine Water Bug Inventory Project was launched to facilitate and to execute taxonomic research and zoogeographical analysis of distribution patterns. As a result, Philippine aquatic bugs are probably better known and more comprehensively studied than other aquatic insects. At present, water bug studies are continuously being done and some species might be suitable as bioindicators, either for habitat conditions or even water quality. In this study, we investigate the physico-chemical microhabitat conditions and environmental variables and their influence of the water bug assemblages. The study is mainly based on data collections at the Baroc River catchment in Roxas, Oriental Mindoro from 2011 to 2017. The organismic samples were identified on (morpho-)species level and analyzed along with the environmental variables by multivariate statistical methods (Non-Metric Multidimensional Scaling (NMS) and Canonical Correspondence Analysis (CCA)). The study revealed strong microhabitat preferences for several Mindoro-endemic taxa (e.g. *Apheilocheirus freitagi* (Apheilocheiridae); *Asthenocoris luzonensis paradisianus* (Naucoridae); *Rhagovelia* spp. (Veliidae), in regard to water current, substrate, and land-cover / vegetation type. However, correlations with water quality parameters were not strong enough to suggest any particular species as saprobic indicator, at this stage. The observed patterns are discussed in regard to various respiration mechanisms and other ecological adaptions in water bugs. Nevertheless, particular taxa and heteropteran species richness are found to be suitable for monitoring general habitat disturbance.

# Poster Presentations

### Assessing the herpetofaunal population in three abaca (*Musa textilis*) plantations of Viga, Catanduanes, Luzon Island, Philippines

**Maricon G. Vargas**

*Catanduanes State University*

There has been lack of studies in the taxonomy and population status of herpetofaunal species present within the abaca plantations of the island of Catanduanes. This study determined and described the taxonomy and population status of the differenrent herpetofaunal speciesin three selected abaca plantations of Viga, Catanduanes. A visual encounter survey, randomized walk design within contrained area was used in this study. A descriptive method that was carried out by traversing an area on foot and searching surfaces, vegetation, overturning rocks and logs, looking in crevices and rock outcrops, replacing all surface objects after examining the ground beneath. Each of the sampling sites was subjected to a visual encounter survey (VES) for 8 hours total per visit. Sites were visited from October to December 2016. There were at least five days lag between all site visits. This study recorded 8 species of reptiles and and 8 species of amphibians at Almojuela Viga, Catanduanes; 9 species of reptiles and 6 species of amphibians at Sitio Summit Viga, Catanduanes; and 8 species of reptiles and 7 species of amphibians in Sitio P. Vera Viga, Catanduanes. There were 10 species of reptiles and 8 species of amphibians in total. In addition, single amphibian species known as *Rhacophorus bimaculatus* and single reptilian species identified as *Boiga drapeizii*, are new geographical records in the island. This study demonstrates widespread distribution of herpetofaunal species within the abaca plantations in the island not formerly reported.

### Diet analysis of fruit bats using metagenomics to assess plant dispersal in the tropical lowland forests of Palanan, Isabela

Edwino S. Fernando[1], **Jessica D. Rey**[2], Sandra L. Yap, Kris A. Otizo[2], Karen Mae R. Lego[2], Perry S. Ong[2]

[1]*University of the Philippines Los Baños*
[2]*University of the Philippines Diliman*

The dispersal of seeds is oftentimes crucial for survival as it allows the seed to escape from density-dependent threats near the mother tree where conspecifics abound and mortality is high (Comita et al., 2014). The role of fruit bats in seed dispersal as a major driver of biodiversity is therefore emphasized. Molecular approach to the diet analysis of bats is expected to contribute to the limited number of known food sources of bats in the tropical forest. The main objective of this study is to determine which plant species depend on bats for seed dispersal through diet analysis using the NGS platform. Assessment on the variation in bat-dispersed species was done across seasons and years in the forest during the period of February 2016 to March 2018. Here, we report the first year output of both voucher and seed DNA collection from the four sites in the Palanan forest plot. The bat fecal samples from eight species which were directly collected were preserved with ethanol. Out of eight species of bats, only three (*Ptenochirus jagori*, *Cynopteris brachyotis* and *Desmalopex leucopterus*) have enough seeds for extraction. DNA from the pooled samples was extracted and the trnH-psbA intergenic spacer region was amplified with 300 bp long primers with attached adapter sequence. The sequences generated from the NGS were cross-referenced to the available database of trnH-psbA sequences of the trees in the plot. The tree species were confirmed by both sequence data and voucher samples in the UP IB Herbarium collection.

# Poster Presentations

### Diversity, endemicity, and microhabitats of herpetofauna in Andanan Watershed, Caraga Region, Philippines

**Chennie L. Solania**, Jerry T. Cuadrado, Eve F. Gamalinda

*Department of Biology, College of Arts and Sciences, Caraga State University*

Preliminary herpetofaunal assessment was conducted in one of the most important water sources in Northeastern Mindanao, the Andanan Watershed, Bayugan, Agusan del Sur using cruising method and mark-recapture technique for a total of 192 man-hours last April 2017. Amphibians and reptiles are important bioindicator species and their population worldwide is in decline, hence there is a need to account them for conservation and monitoring. There were 11 species of amphibians (n=141, H'=1.9) belonging to seven families, and ten species of reptiles (n=73, H'=1.8) from six families that accounted for the species composition. High levels of endemism and threatened taxa were recorded in which 72.7% of the amphibians were endemic with one near threatened (*Limnonectes magnus*) and one vulnerable (Megophrys stejnegeri) to extinction while 40% of the reptiles recorded were Philippine endemics and *Cuora amboinensis* were regarded as a vulnerable species. Overlapping of microhabitat preferences was observed as most of the amphibians were aquatic and many of the reptiles, such as skinks, were terrestrial. The data gathered in this study increases the knowledge on the herpetofaunal records of Mindanao particularly in Caraga Region. To minimize the anthropogenic activities in the area such as conversion of primary forest to agricultural lands and hunting of herpetofauna, there is a need for long-term conservation to safeguard the species of amphibians and reptiles as well as other wildlife in the watershed especially those that are endemic and threatened taxa.

### DNA barcoding of Carangid fishes (Family Carangidae) in Manila Bay using cytochrome c oxidase subunit I (COI) gene

**Jovie E. Nicolas**, Aldrian B. Geguinto, Robert Jay N. Ramos, Sarah Joy D. Dizon, Richard F. Clemente, Jonas P. Quilang[1]

*Bulacan State University*
*[1]University of the Philippines Diliman*

Family Carangidae is considered as commercially important family of fishes. It is a major food source and play an important role in fishery industry. In this study, a total of 34 individuals belonging to seven species of Carangid fishes in Manila bay were barcoded using the mitochondrial cytochrome c oxidase subunit I (COI) gene. Morphological characteristics and BLASTn analysis were used to classify the samples. A Neighbor-Joining tree was constructed with 1000 bootstrap support using Kimura 2-Parameter model. All fish species were discriminated by their COI sequences and clustered with the additional sequences from GenBank except one species of *Decapterus* that warrants further taxonomic investigation since it did not cluster with any COI sequences belonging to the same genus opposing the result of the BLASTn analysis. The average genetic distance within species, within genus *Decapterus* and within family were 0.226%, 9.150% and 16.004% respectively, showing that genetic divergence increases as taxonomic level becomes less exclusive. This study has cited four species of Carangids that were not previously reported to inhabit the area. Furthermore, the results highlight the efficiency of COI barcodes for the rapid and accurate identification of fishes and for identifying species that need further taxonomic investigation.

# Poster Presentations

### Emergency release program for the critically endangered freshwater turtle *Siebenrockiella leytensis*

**Sabine Schoppe**, Sonja Luz[1], Diverlie Acosta, Roseline Mesicampo, Ronelito Esuma

*Katala Foundation*
*[1]Wildlife Reserves Singapore*

In June 2015, 3,831 *Siebenrockiella leytensis* were seized in Southern Palawan. Within two months thereafter, 3,385 apparently healthy individuals were released back to the wild after having undergone thorough health-checks and monitoring as well as cohort notching. Field surveys started immediately after the release to be able to determine the success and possible environmental impacts of this release program. For the post-release monitoring the team covered stream lengths of 1,117–3,554 m with the release site being roughly in the center. As of December 2016, a total of 88 monitoring surveys at the 10 release sites were conducted. 15.5% of the released turtles could be recaptured for health checks. Release seemed to have failed only in one site where 98% of the turtles were no longer detectable. In the other sites, recapture success ranged from 6.4–40% with most recaptures found within 1000 m from the release site. Only 3.4% turtles were found dead short after the release. All recaptured turtles showed good body conditions and previous shell-lesions and wounds had healed well. In the eight sites with resident populations of *S. leytensis*, released turtles contributed 14–78% to the resident individuals in the area. A rehabilitation release is considered successful when the released individuals integrate with the resident wild population, when they can survive without human aid or comfort and when all released individuals die of old age. By applying most of these indicators of success to this emergency release of *S. leytensis*, we are confident to say that up to now the release was successful. Monitoring with continue throughout 2017.

### Mollusk diversity pattern possibly reflects past habitat condition along the Dakil River, University of the Philippines Laguna Land Grant

**Julius A. Parcon**[1,2], Kinsley Meg G. Perez[1], Emmanuel Ryan C. de Chavez[1,2,3]

*[1]Graduate School, University of the Philippines Los Baños*
*[2]Museum of Natural History, University of the Philippines Los Baños*
*[3]Animal Biology Division, Institute of Biological Sciences, University of the Philippines Los Baños*

Being an important component of ecosystem, mollusks can be utilized as indicators of habitat conditions. However, malacofaunal indicator studies in critical areas such as tropical forest watersheds are very limited in the Philippines. To fill this gap, the diversity patterns of land and freshwater mollusks were examined along the Dakil River (DR) within the University of the Philippines Laguna Land Grant (UPLLG), a formerly heavily logged area. For land snails, 12 quadrats (100 $m^2$) were set randomly along DR's riparian forests while for freshwater mollusks, 25 quadrats (15 $m^2$) were established in its upstream and downstream section. Selected environmental variables for each molluscan group were also determined/measured. The malacofaunal diversity in DR, UPLLG was low (land snails, H'=1.19, and freshwater mollusks, H'=1.40). Seven land snail species belonging to three families (Ariophantidae, Bradybaenidae, and Helicarionidae), and seven freshwater species (6 gastropods, 1 bivalve) belonging to 6 families (Thiaridae, Neritinidae, Viviparidae, Ampullariidae, Lymnaeidae, Corbiculidae) were identified. Generalized linear mixed modelling revealed that altitude (E=-0.0106, $p<0.1$) was the most significant predictor for land snail species richness, and canopy cover (E= 0.0286, $p<0.1$) for their abundance. River velocity (E=0.1769, $p<0.05$) was the most important predictor for species richness of freshwater mollusks while abundance was highly affected by temperature (E=0.9621, $p<0.001$) and inversely affected by canopy cover (E=-0.0145, $p<0.001$). The present data suggested that mollusks have specific micro-habitat preference, and their low diversity is possibly indicative of the former forest state in DR, UPLLG.

# Poster Presentations

### Mt. Latian key biodiversity area as local conservation area: province of Sarangani's environmental governance

**Carilyn Salanio-Martin**[1], Emma Peralta-Nebran[1], Steve Chiongbian Solon[2], Rudolph Elmo dela Cruz[3], Ali M. Hadjinasser[4], Allan Rivera[5], Luciano Lumancas[6]

*[1]Province of Sarangani-Environmental Conservation and Protection Center; [2]Provincial Government of Sarangani [3]Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH; [4]Department of Environment and Natural Resources XII; [5]Municipal Environment and Natural Resources Office, Alabel, Sarangani; [6]National Commission on Indigenous Peoples*

Mt. Latian is identified as one of the key biodiversity areas (KBA 192) and Important Bird Area (PH106) declared by DENR in 2002. It straddles Regions XI and XII, encompassing the provinces of Sarangani and Davao Occidental. It was declared a KBA since it was categorized as very high terrestrial area of biological importance; very high plant priority site; very high conservation priority for arthropods; extremely high priority site for birds; very high priority site for mammals; with extremely high socio-economic pressures in an area of biological importance. A study funded by GIZ-PAME in 2015, implemented by Environmental Conservation and Protection Center, showed that it is the headwaters of major rivers—encompassing from Buayan-Maribulan, Lun Padidu, Sapu Masla, Lun Masla, Glan to Margus rivers—in Sarangani province. Assessment showed that there are only 2,618.78 and 20,166.39 hectares remaining closed and open canopy forests, respectively. Biodiversity assessment showed high species diversity of flora and aves in three sampling sites categorized from vulnerable to critically endangered species; and limnology studies in the headwaters showed good water quality. Moreover, Mt. Latian is an ancestral domain and home of Blaan, Manobo and Tagakaulo indigenous cultural communities. Thus, Free and Prior Informed Consent process was undertaken. In 2016, the NCIP granted the Certification PreCondition to conserve and protect Mt. Latian to the province of Sarangani. Barangay and municipal councils passed resolutions which became the basis of the Sangguniang Panlalawigan to declare Mt. Latian as Local Conservation Area.

### Rapid assessment of aquatic bugs (Heteromorpha) of the Baroc River catchment in Oriental Mindoro, Philippines

**Kyra Marie Dominique E. Aldaba**, Jemillie Madonna S. de Leon, Earl Kevin F. Fatallo, Arthien Lovell Pelingen, Hendrik Freitag, Clister V. Pangantihon

*Ateneo de Manila University*

Aquatic bugs (Heteroptera) play a major role in the environment as biological control agents and serve as food for higher trophic levels. More than 200 described species of water bugs are presently known in the Philippines. In order to further update the knowledge on diversity and distribution of the heteropteran infraorders Nepomorpha and Gerromorpha, a rapid assessment survey was conducted at the Baroc River Basin in Roxas, Oriental Mindoro, Philippines. About 20 species in seven families of Nepomorpha and five families of Gerromorpha were identified among specimens of the current and previous samplings in the area. Island-endemic species or subspecies like *Aphelocheiris freitagi*, *Enithares martini mindoroensis* and *Hydrotrephes stereoides mindoroensis* were identified among the specimens. Additional notes on the taxa's habitat and ecology are presented, since distinct habitat preferences or restrictions were observed.

# Poster Presentations

### Rapid assessment of bird species diversity in natural and rehabilitated mangrove forests in Quezon, Philippines

Maria Lourdes Q. Moreno, **John Benrich M. Zuniga**,
Mark Angelo C. Bucay, Alvin S. Gestiada, Riselle C. Ahillon-Evangelista

*Ecosystems Research and Development Bureau*

Rapid assessment of bird species was conducted in a natural and in rehabilitated mangrove forests located in Pagbilao and Catanauan, Quezon respectively. A total of 42 species belonging to 28 families were observed in both sites. In Pagbilao, 36 species from 25 families dominated by Ardeidae and Scolopacidae were observed while 34 species from 23 families dominated by Columbidae were noted in Catanauan. Shannon-Weiner diversity index was computed at 2.99 in Pagbilao and 3.15 in Catanauan. Five endemic species were noted in Catanauan compared to three species in Pagbilao. The endemic species observed include: Philippine Serpent Eagle (*Spilornis holospilus*), Philippine Duck (*Anas luzonica*), White-eared brown dove (*Phapitreron leucotis*), Guaiabero (*Bolbopsittacus lunulatus*) and Philippine pied fantail (*Rhipidura nigritorquis*). In terms of feeding guild, more insectivorous species were observed in Pagbilao (53%) while frugivorous species comprise a larger portion in Catanauan (both 29%). Diversity t-test showed no significant difference in terms of species richness between the study sites (p=0.038). Moreover, Sorenson's similarity index was computed at 0.83 showing high similarity in terms of species richness. The results suggest that rehabilitated mangrove forests can accommodate bird species comparable with natural mangrove forests. The study can also serve as input to the management plan of Pagbilao and Catanauan mangrove forests.

### Recircumscription of *Vanoverberghia* Merr. (Zingiberaceae) including a reinstatement and a new name based on molecular and morphological data

**Rudolph Valentino A. Docot**[1], Cecilia I. Banag[2], Danilo I. Tandang[3], Axel Dalberg Poulsen[4]

[1]*Far Eastern University*
[2]*University of Santo Tomas*
[3]*National Museum of the Philippines*
[4] *Royal Botanic Gardens Edinburgh*

*Vanoverberghia* Merr. is a small genus in the family Zingiberaceae with only two accepted species, *V. sepulchrei* Merr. from the Philippines and *V. sasakiana* H. Funak. & H. Ohashi from Taiwan. Inside the tribe Alpinieae, the genus is considered exceptional by its bifid labellum with subulate lobes, lateral corolla lobes that are basally connate to each other and to the labellum, filiform lateral staminodes, and absence of bracteoles. In this study, the reinstatement of *Vanoverberghia diversifolia* Elmer, and a new name, *Vanoverberghia moricei* Docot, Banag & Poulsen nom. nov. were done based on the findings of the combined molecular and morphological data. The combined analyses of the ITS and trnK/matK region strongly support these taxonomic decisions as the two latter species grouped together with *V. sepulchrei* and *V. sasakiana*, and formed a strongly supported monophyletic group (PP=1.00; BS=100) inside the *Alpinia eubractea* clade of the tribe Alpinieae. The morphological description of both species were revaluated and updated by examining and comparing recent collections to types and protologues, especially on *V. diversifolia* since it was described only based on fruiting material. Some of the morphological characters of *V. diversifolia* and *V. moricei* are new to the genus, thus a wider generic circumscription was provided. Since the combination of *Alpinia vanoverberghii* Merr. in *Vanoverberghia* will result to a tautonym, a new name was made using the first name of Father Morice Vanoverbergh, to whom the genus was named. Two lectotypes were designated and a key to *Vanoverberghia* species was provided.

# Poster Presentations

### Species inventory of macroinvertebrates in freshwater areas in Poro and Ponson Islands, Cebu, Philippines

**Serapion N. Tanduyan**, Jiezel L. Nudalo, Jonar D. Gonzales, Dharel Miro,
Eva P. Muaña, Norberto B. Andrade, Aderito G. Gonzales II

*Cebu Technological University*

The study on macroinvertebrates in freshwater areas of Poro and Ponson Islands was conducted in lentic environments. There are 13 species of macroinvertebrates which include four species of mollusks (*Stenomelania* sp., *Pomacea canalliculata*, *Melanoides tuberculata*, and *Radix* sp.); two species of freshwater crabs (*Geosesarma lawrecei* and *Geosesarma rathbunae*); seven species of insects (*Laccophilus minutus*, *Limnogonus fossarum*, *Limnephilus flavicornis*, *Baetis subalpinus*, *Cratilla metallica* and *Agabus bipustulatus*); and a species of *Chironomidae larva* (bloodworm). Common species of macroinvertebrates in the two islands are: *Melanoides tubeculata* (Mollusk); *Geosesama rathbunae* (Freshwater Crabs); Insects: *Limnogus fossarum*, *Baetis subalpinus*, *Agabus bipustulatus*, and *Chironomidae larva* (bloodworm). Mollusks found only in Poro Island are *Stenomelania* sp., *Pomacea canaliculata* and *Radix* sp. For the freshwater crab is *Gersesarma lawrecei* and for the insects is *Limnephelus flavicornis*. Two are only found in Ponson Island. They are *Laccophilus minutus* and *Cratilla metallica*. The most abundant mollusks is *Melanoides tuberculata* (50 pieces) in Ponson Island followed by *Stenomelania* sp. (30 pieces) that is from Poro Island. For the freshwater crab the most abundant is *Geosesarma rathbunae* (5 pieces) in Poro Island. For the Insects is *Baetis subalpinus* (50 pieces), *Chironomidae larva* (40 pieces) and *Limnogonus fossarum* (17 pieces) all in Ponson Island.

### Stock assessment of commercially valued fish species in Naujan Lake

**Roland D. Urate**, Algeline S. Herrera, Justin Niljohn Errol A. Bautista,
Stanley Brian D. Alaba, Rommel F. Matre, Kim D. Salas

*Mindoro State College of Agriculture and Technology- Bongabong Campus*

Naujan Lake ranks as major lake of the Philippines being the fifth largest lake, and serves as a home for diverse flora and fauna. People in the surrounding communities depend on the lake for their livelihood. Fishing is a major source of livelihood in communities along the lake. Stock assessment was done to determine the commercially important fishes caught in Naujan Lake in association with the fishing gears used. Data was gathered using questionnaire and interview given to the fishermen. Field survey was done twice a month from July to November to determine the fish stocks, and catch by volume alongside with the fishing gears. Eighty fishermen served as the respondents of the study. Results recorded 13 species of fish from 11 families as a common catch: nile tilapia (*Oreochromis niloticus*), common carp (*Cyprinius carpio*), silver therapon (*Therapon plumbeus*), white goby (*Glossogobius giuris*), mudfish (*Channa striata*), catfish (*Clarias batrachus*), mullet (*Mugil cephalus*), milkfish (*Chanos chanos*), snakehead gudgeon (*Giuris margariticeae*), gourami (*Trichopodus pectoralis*), prussian carp (*Carassius gibelio*), redbelly tilapia (*Tilapia zilli*) and big-eyed trevally (*Caranx marginatus*). Other aquatic species such as scissor prawn (*Macrobrachium latidactylus*) and asian clam (*Corbicula fluminea*) are caught in less volume. Three migratory fish species were recorded during the assessment period, the milkfish, mullet and big-eyed trevally. The fishing gears used was gill net, spear gun, fish pot, fish trap, encircling net, spear, and long line. Gill net was found to be the most efficient gear relative to fish catch volume, particularly tilapia.

# Poster Presentations

### The mangrove community of Bongabong: allometric estimation of the above-ground biomass

**Randy A. Quitain**, Algeline S. Herrera, Fritz Dustin M. Fiedalan

*Mindoro State College of Agriculture and Technology-Bongabong Campus*

Mangrove ecosystems in the coastal strips significantly contribute to the carbon sequestration dynamics, which addresses an effective and sustainable climate change mitigation. The biomass index which refers to the productivity of mangroves provide an important basis for carbon estimation. The study assessed the mangrove sites for estimation of aboveground biomass using allometric models developed by previous studies. Five mangrove stations in the municipality of Bongabong were selected for the measurement and monitoring of their forest stand. Quadrat method with dimensions of 50 x 50 meters was employed in order to identify the species and to determine the stem diameter. Diameter at breast height will serve as an independent variable for allometric analysis, and were measured at breast height or approximately 1.3 meter above ground level. Results using the allometric equation designed by Mahmood et al. (2015) showed that the mean aboveground biomass of the mangroves of Bongabong was 1.926 kg/m$^2$. Highest mean aboveground biomass at species level was demonstrated by *Sonneratia alba*, *Avicennia marina* and *Rhizophora apiculata*. The estimated aboveground biomass displayed the productivity of the mangroves of Bongabong. Quantitative data regarding biomass index may serve as prerequisite for carbon stock estimation. In order to obtain relevant computational results, other parameters should be included, such as wood density and tree height. Wood densities from species- and region-specific mangroves where possible in allometric computations.

### Updates on the distribution and diversity of diving beetles Family Dytiscidae (Insecta: Coleoptera: Dytiscidae) in the Philippines

**Ivy Joy R. Saen** and Hendrik Freitag

*Ateneo de Manila University*

The inventory of the indigenous invertebrate fauna is an important need in the Philippines as a biodiversity hotspot. While the diversity, distribution, and ecology of many taxa are not yet well studied, the threats to biodiversity are still eminent due to population growth, land conversion, and habitat destruction. More efforts in biodiversity research are very important to further develop appropriate conservation strategies. This study aims at updating the knowledge on the Philippine Predacious Diving Beetle fauna. Of the 20 dytiscid genera present in the country, we provide updates for *Platynectes*, *Copelatus*, *Lacconectus*, *Cybister*, *Eretes*, *Hydaticus*, *Sandracottus*, *Clypeodytes*, *Hydroglyphus*, *Hydrovatus*, *Hyphydrus*, *Leiodytes*, *Microdytes*, *Laccophilus* and *Neptosternus* based on museum specimens and university collections. New records of 40 species and subspecies are presented, in which seven of these are endemic and some presumably undescribed. The data collected contribute to the understanding of Aquatic Coleoptera, specifically the Philippine's dytiscid diversity and distributions. This will help supporting future conservation and management strategies of aquatic insects in the country and making them useful as bioindicator organisms. We also aim to advertise a forthcoming publication that presents the first identification key for a Philippine water beetle family.

# Workshops

# Workshop

## Conservation Fundraising: Lessons Learned

*Facilitator:* David L. Waldien, *Christopher Newport University*

Meaningful biodiversity conservation and research requires not only good ideas and effective study designs, it also requires adequate funding that meets the needs of projects and longer initiatives. Unfortunately, all too often funding is the greatest factor that makes the difference in the degree of success of an initiative. Effective fundraising is an essential skill for anyone who is interested in biodiversity conservation and research, and is something that many people have limited training and experience in. Further, a single approach to proposal writing will not work for all funding opportunities as they have different interests and often require different levels of details. In this workshop, we will have a facilitated group discussion to explore approaches to answering critical questions often encountered in proposals. In doing so, we will share lessons learned so you do not have to make the same mistakes others may have made in the past.

# Workshop

## Consultation Workshop on Flying Fox Conservation Action Plan

*Facilitators:* Lisa Paguntalan, Godfrey Jakosalem, *Philippines Biodiversity Conservation Foundation*
Anson Tagtag, *Biodiversity Management Bureau*

The Philippines is a country that is extremely rich in endemic species but is nonetheless facing high deforestation rates and threatened species numbers. Ten species of flying foxes—mostly endemic—occur in the Philippines: Golden-crowned flying fox *Acerodon jubatus*, Palawan flying fox *Acerodon leucotis*, Mottle-winged flying fox *Desmalopex leucopterus*, Mindoro pallid flying fox *Desmalopex microleucopterus*, Ryukyu flying fox *Pteropus dasymallus*, Common island flying fox *Pteropus hypomelanus*, Little golden-mantled flying fox *Pteropus pumilus*, Philippine gray flying fox *Pteropus speciosus*, Giant flying fox *Pteropus vampyrus*, and the Mindoro stripe-faced fruit bat *Styloctenium mindorensis*. These species are protected under the Wildlife Resources Conservation and Protection Act (RA 9147). A total of 101 known flying fox roosting sites have been identified in the Philippines.

Some of these species are both endemic and endangered. The Golden-crowned flying fox *A. jubatus* is listed as endangered under the IUCN categories, but the DENR is proposing to uplist its status to Critically Endangered under the Philippine Red List of Threatened Fauna. Palawan flying fox *A. leucotis* is listed as Vulnerable, while several species are considered data deficient. The principal threats to Philippine flying foxes are overpopulation and deforestation, worsened by intense hunting on all larger pteropids for food (mostly for local consumption, especially as 'finger food' or pulutan) and in retaliation for the perceived damage caused by flying foxes to orchards.

Both government and non-governental organizations have targeted the research and conservation of these species. The Bat Count Philippines has been successful in identifying roost colonies and population estimates of flying foxes. The group has been actively promoting the conservation of giant flying foxes in the Philippines through research, raising public awareness, and providing training to local researchers, conservationists, and government employees (Mildenstein 2011). In 2015, the Biodiversity Management Bureau mandated the DENR regional offices to conduct flying foxes monitoring surveys, locate colonies in their respected regions, manage flying fox roosts within designated roosting colonies, and provide protection in partnership with different local government units and non-government organizations. The Filipinos for Flying Fox Project of the Biodiversity Management Bureau, Bat Conservation International, and the Philippines Biodiversity Conservation Foundation, Inc. proposes to address the conservation of flying foxes, particularly the Golden-crowned flying fox, by creating conservation reserves and working with different stakeholders and the government.

# Workshop

Consultation Workshop on Flying Fox Conservation Action Plan

The conservation of the flying foxes requires an in-depth conservation design, in-line with the Philippine Biodiversity Strategy and Action Plan and the Key Biodiversity Areas (KBA), in establishing conservation reserves within protected areas and non-protected areas in the country. This action plan designed for flying foxes aims to a) to conserve and protect flying foxes roosting colonies throughout the country and potentially declare critical habitats and local conservation areas; b) improve the conservation status of the ten species of flying foxes until they are removed them from the Philippine Red List of Threated Fauna; and c) guide the government, conservationist, and stakeholders in identifying priority actions that will inform future conservation programs and ensure the widespread implementation of measures to help support and protect flying foxes throughout the country.

*Objectives:*

This workshop contributes to the development of a Philippine Flying Fox Strategy and Action Plan. Specifically, the workshop aims to bring together experts and practitioners to:

1. Present current knowledge and conservation status of flying foxes;
2. Document different initiatives, and identify gaps and opportunities relative to flying foxes;
3. Use available information in developing the Philippine Flying Fox Strategy and Action Plan.

# Workshop

## Forest and Coastal Resources Information Extraction from LiDAR

*Facilitators:* Gio P. Zaragosa, Anjenneth Palmon, Aeron Adrian C. Maralit, *Phil-LiDAR 2: FRExLS*
Kristina Di Ticman, Mia Shaira Estabillo, *Phil-LiDAR 2: CoastMap*

THE WORKSHOP would aim to inform its participants about the current efforts in research connected to forest and coastal resources mapping using a fast emerging remote sensing technology, Light Detection and Ranging (LiDAR). The workshop will consist of presentations about data processing related to the generation of the forest and coastal resources related maps such as the Mangrove Cover, Aquaculture Extraction, Canopy Height Model, Canopy Cover Model, Biomass and Carbon Stock Estimate Maps, Forest Cover Classification and Tree Counting on Plantation forests. This resource maps would be essential in applications in forest and coastal resource management. Basically, the topics of the workshop would present the current status of a DOST funded research project being implemented by the UP TCAGP entitled Phil-LiDAR 2 Program: Nationwide Detailed Resources Mapping using LiDAR. Specifically, the Project 2: Aquatic Resources Extraction from LiDAR Surveys (CoastMap) and Project 3: the Forest Resources Extraction from LiDAR Surveys (FRExLS).

# Workshop

## Freshwater Arthropods: State of Knowledge in the Philippines and Priorities for Future Research and Conservation (a hands-on workshop)

*Facilitators:* Hendrik Freitag, Clister Pangantihon, Jhoana Garces, Arthien Pelingen
*Department of Biology, Ateneo de Manila University*

ALBEIT the previous decade (2005–2015) had been proclaimed an 'International Decade for Action — Water for Life' with conservation priority for freshwater biodiversity, threats to freshwater biota have further increased. Although taxonomic and ecological knowledge of Philippine aquatic arthropods is still insufficient, the interest in freshwater macroinvertebrates has risen in recent years.

This workshop aims to discuss the state of knowledge, methods and developments of biosystematic research in Philippine freshwater arthropods. An introductory lecture will skim through the common taxa of freshwater macroinvertebrates, highlight their ecological importance and emphasize their potential use as bio-indicators and environmental monitoring organisms. A subsequent visit of an in-campus habitat site will allow for the collection of some common aquatic invertebrates and participants will attempt to identify some taxa under the microscope during a lab session. Priority will be given to aquatic insects. Literature, handouts, and assistance will be provided. We will deliver insight into the principles and problems of the scientific description of new species, as well as some practical tips for field studies.

# Workshop

## Generating Stakeholders' Support for Sea Turtle Conservation: From Diet to Conservation: The Case of Biodiversity Conservation in Puerto Princesa's Northeast Area and its Attached Interconnected Ecosystems

*Facilitators:* Bonifacio C. Tobias, Corazon Liwanag, *Candis III Marketing Coop*
Vivian Soriano, *DENR Puerto Princesa City*
Eugene M. Gonzales, Kim B. Blasa, *Gerry Roxas Foundation*
Nilo Ramoso, *Biodiversity Management Bureau*

Candis 3 Marketing Coop will showcase its experience in implementing a sea turtle conservation project on the west coast of Puerto Princesa City as an offshoot of the project "Biodiversity Conservation in Puerto Princesa's Northwest Area and its Attached Interconnected Ecosystems." This project is supported by the USAID-Phil-AM Fund and administered by the Gerry Roxas Foundation.

Local residents on the west coast of Puerto Princesa City eat sea turtle. Communities are vocal in saying that sea turtle is part of their diet. Students from both elementary and high school levels were also vocal about eating sea turtle eggs as well as the mother/nester. For the Indigenous People, this is part of their traditional food.

With the biodiversity conservation initiated by the project, it was able to transform poachers to pawikan advocates and gained the communities' support as partners and collaborators, including the Indigenous Peoples. Communities became compliant to RA 9746 and RA 10654 (Wildlife Act and Fisheries Code of the Philippines).

Further, the project proved that Hawksbill and Olive Ridley turtle species nest at the coasts of the west coast of Puerto Princesa City. This was then an anecdotal statement according to DENR-BMB and DENR CENRO.

# Workshop

## Workshop for Developing Standardized Tools for Urban Biodiversity Assessment

*Facilitator:* Joy M. Navarro, *Biodiversity Management Bureau*

According to the State of the World Cities Report in 2013, by 2050, the world population is expected to reach 9 billion. The urban population of the developing world will be 5.3 billion while Asia alone will host 63% of the world's urban population, or 3.3 billion people. City biodiversity exposes urban residents to an environment or landscape which facilitates their appreciation for nature. It provides opportunities for recreation, health, relaxation and community cohesion. Green area accessibility has been linked to reduced mortality and improved perceived and actual general health. Psychological benefits of green space increase with biodiversity and that a green window increases job satisfaction and reduces stress (PBSAP, 2016).

This is the reason why in May 2008, UN Convention on Biological Diversity (CBD) member countries began discussions on promoting biodiversity in an urban setting in recognition of the huge impact of cities in the areas of production, consumption, waste generation, pollution and habitat loss. It was during this time that a Plan of Action in Nagoya, Japan was forged, which encourages Parties to actively engage subnational governments, cities and other local authorities in implementing the CBD. The Plan of Action also advocates the use of the City Biodiversity Index (CBI), also known as the Singapore Index on Cities' Biodiversity (Singapore Index) as a monitoring tool to assist local authorities to evaluate their progress in urban biodiversity conservation.

However, the scope of biodiversity in the cities in the Philippines is not as clearly defined as biodiversity in non-urban areas, and the status, trends, and threats to urban biodiversity are currently not well understood, thus the Philippine Biodiversity Strategy and Action Plan (PBSAP) has recently identified urban biodiversity as a thematic area. The PBSAP targeted that by 2028, there will be a 5% increase in the proportion of terrestrial natural areas in the 5 largest cities. In addition, by 2028, as result of improved conservation, ecosystem services provided by key biodiversity areas will be enhanced.

# Workshop

**Workshop for Developing Standardized Tools for Urban Biodiversity Assessment**

The Biodiversity Management Bureau is drafting a Technical Bulletin on Urban Biodiversity Assessment which would provide DENR offices with the standards/ procedures in assisting local government units in determining the condition of existing urban biodiversity to be able to update bio-physical profiles and develop relevant reports on the state of biodiversity. The draft Technical Bulletin had been subjected to several reviews and among the suggestions was to identify and recommend assessment tools which are specifically applicable in the urban setting.

Since the urban environment is quite complex and differs extensively from the natural environment, it is expected that the existing tools for biological and socio-economic assessments would be modified and updated through inputs from experts and would-be users.

The Workshop would then contribute to the development of standardized tools for urban biodiversity assessment. The draft technical bulletin will also be presented to a wider range of stakeholders, particularly to the biologists, researchers and other conservationists attending in the Symposium, in order to capture different points of view from potential users and partners.

# Acknowledgments

**BCSP Board Members**

President: Cynthia Adeline Layusa-Oliveros

Vice President: Willem van de Ven

Secretary: Nikki Dyanne C. Realubit

Treasurer: Aris A. Reginaldo

Auditor: Rainier I. Manalo

Members:

Joni T. Acay

Moonyeen Nida R. Alava

Apolinario B. Cariño

Juan Carlos T. Gonzalez

Angela Nina R. Ingle

Myrissa V. Lepiten-Tabao

Ruth C. Martinez

Don Geoff E. Tabaranza

Mae Lowe L. Diesmos (adjunct)

Hendrik Freitag (adjunct)

Emerson Y. Sy (adjunct)

Emeritus:

Angel C. Alcala

Carlo C. Custodio

Lawrence R. Heaney

Blas R. Tabaranza, Jr.

**Ateneo de Manila University**

Jose Ramon T. Villarin, SJ, President,

Evangeline Bautista, Acting Vice President for Loyola Schools, and Dean, School of Science and Engineering

Atty. Jaime Hofileña, Vice President for Social Development

Ateneo Campus Events Management Office

Office of Facilities and Sustainability

Ateneo Institute of Sustainability

Crisanto M. Lopez, Chair, Department of Biology

Maria Katrina C. Constantino

Adria Rae Abigail R. Eda

Janice A. Ragaza

Ninez Bernardine L. Manaloto

Ronald Allan L. Cruz

Earl Kevin Fatallo

Steve Chaves

Arthien Lovell P. Pelingen

Clister V. Pangantihon

Zomesh A. N. Maini

Hendrik Freitag

# Acknowledgments


*Symposium Coordinator:*

Michelle Encomienda

*Secretariat and Registration:*

Ruth C. Martinez

Joni T. Acay

Aris A. Reginaldo

Eva Marie Maboloc

Sarah Christina W. Estacio

Louise Abigail A. De Layola

Janice A. Ragaza

Stephanie Velasquez

*Moderators and Facilitators:*

Myrissa Lepiten-Tabao

Juan Carlos. T. Gonzalez

Leticia E. Afuang

Desamarie Antonette P. Fernandez

Crisanto M. Lopez

Mae Lowe L. Diesmos

Zomesh A.M. Maini

Hendrik Freitag

Jhoana Garces

Ninez Bernardine L. Manaloto

Willem van de Ven

Nikki Dyanne C. Realubit

*Volunteers:*

Jaime C. Ferrer

Antonio N. Lorenzo II

Levy Necesito

Sarah Christina W. Estacio

Louise Abigail A. De Layola

Eva Marie C. Maboloc

Henry G. Calilung and the Senior High School students of Holistic Education and Development Center (HedCEN)

Ateneo Biological Organization (BOx)

*Logistics:*

Christopher Castillo

Vince Cosmiano

Eloisa Sacramento

Ynna Cellano

Adria Rae Abigail R. Eda

Crisanto Lopez

Hendrik Freitag

Don Geoff E. Tabaranza

Earl Kevin F. Fatallo

*Documentation:*

Emerson Y. Sy

Don Geoff E. Tabaranza

*Exhibits and Posters:*

Rainier I. Manalo

Mae Lowe C. Diesmos

Adria Rae Abigail R. Eda

Jaime C. Ferrer

*Fundraising:*

Cynthia Adeline A. Layusa

Ruth C. Martinez

Hendrik Freitag

Louise Abigail de Layola

Sarah Christina W. Estacio

Don Geoff E. Tabaranza

Abstract Review:

Carlo C. Custodio

Mae Lowe L. Diesmos

Emerson Y. Sy

Hendrik Freitag

Desamarie Antonette P. Fernandez

Ma. Katrina C. Constantino

Janice A. Ragaza

*Meals and Socials*

Mae Lowe L. Diesmos

Apolinario B. Carino

Nikki Dyanne C. Realubit

David Justin R. Ples

Ma. Katrina C. Constantino

Janice A. Ragaza

Ronald Allan L. Cruz

*Awards:*

Cynthia Adeline A. Layusa

Emerson Y. Sy

*Field Trips and Tours*

Hendrik Freitag

Abigail Marie T. Favis

# There's hope for Philippine biodiversity.

Germany and the Philippines are working side by side to save the Philippines' biodiversity and its habitats, through institutional, policy, systems, knowledge, and skills development.

german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

(Photo: "Biodiversity and historical treasures" by Mark Joseph Francisco, grand prize winner, Selfie for Biodiversity photo contest, Non-selfie Category, BMUB-GIZ Protected Area Management Enhancement Project)

# Electrification

Beyond the business of providing reliable power, TeaM Energy recognizes its role in nation-building of providing sustainable energy to communities.

# Environment

We contribute to sustainable development by protecting the biodiversity in areas where we operate, supporting the national agenda of preserving the remaining forests, and at the same time, minimizing the impact of our business to society.

TeaM Energy®
Foundation

TeaM Energy puts great value on programs that seek to improve the quality of education in the country and make Filipinos more competitive globally.

# Education

Just like the long stretch of power lines that connect communities, TeaM Energy believes in connecting people through collaborative partnerships.



# Engagement

Partner with us ● www.teamenergy.ph ● (02) 5528000


PENSOFT
Science Publisher & Technology Provider
www.pensoft.net
See the full list of Pensoft journals at: pensoft.net/browse_journals
published on
arpha
www.arphahub.com

## Where We Have Been

Since 1992, Filipino and international wildlife biologists and practitioners working on research and conservation of Philippine biodiversity have been meeting every year at different venues around the Philippines for the annual Philippine Biodiversity Symposium.

**Symposium Venues:**

**2017: Ateneo de Manila University, Quezon City**
2016: Calapan, Oriental Mindoro
2015: Catarman, Northern Samar
2014: Talamban, Cebu City, Cebu
2013: Musuan, Bukidnon
2012: City of Manila & Dasmarinas City, Cavite
2011: Dumaguete City, Negros Oriental
2010: Legazpi City, Albay
2009: Baguio City, Benguet
2008: Baybay, Leyte
2007: Davao City, Davao del Sur
2006: Puerto Princesa City, Palawan
2005: Tuguegarao City, Cagayan Valley
2004: City of Antipolo, Rizal
2003: Murcia, Negros Occidental
2002: Cebu City, Cebu
2001: Dumaguete City, Negros Oriental
2000: Tagaytay City, Cavite
1999: Puerto Princesa City, Palawan
1998: Davao City, Davao del Sur
1997: Los Banos, Laguna
1996: Dumaguete City, Negros Oriental
1995: Quezon City, Metro Manila
1994: Initao, Misamis Oriental
1993: Los Banos, Laguna
1992: Dumaguete City, Negros Oriental

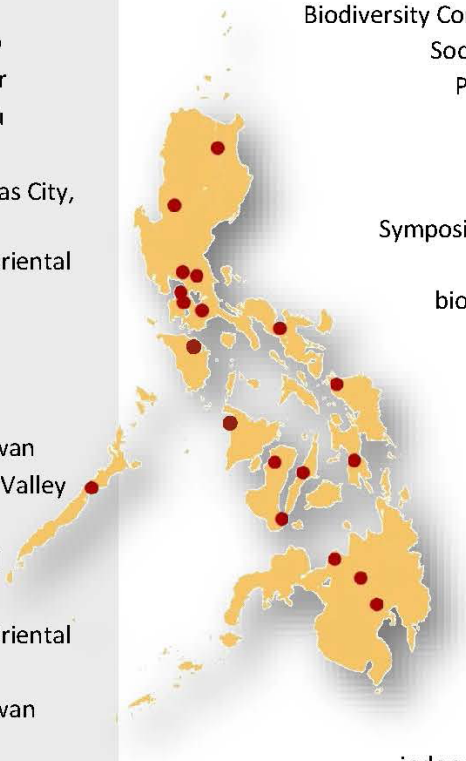

*Illustration and photo credit: Rolly Urriza, Arvin Diesmos, Nestor Bartolome, William Oliver, Tony Pyrzakowski, Vhon Garcia, Prime Premne and Cynthia Layusa.*

# The Annual Philippine Biodiversity Symposium

## About the Symposium

The Philippine Biodiversity Symposium is an annual gathering of Filipino and international researchers and practitioners working in the fields of wildlife studies and biodiversity conservation in the Philippines. The symposium is organized by the Biodiversity Conservation Society of the Philippines.

*2015 Annual Philippine Biodiversity Symposium logo*

Symposium activities include an institutional exhibit of organizations involved in biodiversity research and conservation, keynote presentations from distinguished wildlife scientists and conservation practitioners, concurrent workshops, and contributed oral and poster presentations.

The symposium draws over 250 participants from the academic and research institutions, government agencies, non-governmental organizations, independent researchers, and high school, undergraduate and graduate students.

For more information:
Website: www.biodiversity.ph
Email: symposium@biodiversity.ph
Facebook: @biodiversity.conservation.ph
Instagram: biodiversity.ph

# The 26th Annual Philippine Biodiversity Symposium

*The 26th Annual Philippine Biodiversity Symposium logo by Prime Premne/ BCSP*

The 26th Annual Philippine Biodiversity Symposium, hosted by the Department of Biology of the Ateneo de Manila University, will be held at the Ateneo de Manila University campus in Katipunan Avenue, Loyola Heights, Quezon City on 18-22 July 2017.

Symposium Events:

- Institutional Exhibits
- Plenary Presentations
- Workshops
- Scientific Paper Presentations
- Scientific Poster Presentations and Pecha Kucha

For more information:
Website: www.biodiversity.ph
Email: symposium@biodiversity.ph
Facebook: @biodiversity.conservation.ph
Instagram: biodiversity.ph

The Biodiversity Conservation Society of the Philippines (BCSP) formerly called the Wildlife Conservation Society of the Philippines (WCSP) is a professional organization of wildlife researchers, managers, scientists and conservationists. It has the aim to advance biodiversity research and conservation in the Philippines by facilitating communication and contributing to improved research and conservation capabilities of those working on Philippine biodiversity particularly members of the association, and to increase public awareness, appreciation, and understanding of Philippine biodiversity.