Department of Biological Sciences
College of Science & Mathematics
University of Southern Mindanao

COMPLIANCE NARRATIVE

1. Program

a. Name of the Program	: **Master of Science in Biology**
b. Specializations/ Majors:	
c. Degree granted	: **Master of Science in Biology**
2. Academic unit where the Program is offered	**: Graduate School**

3. Institution

a. Name	: **University of Southern Mindanao**
b. Location of the Main Campus	: **Kabacan, Cotabato**
c. Campus where the Program is offered	**: Main Campus**

4. Name and Title of the:

a. Head/ Chair of the Program	: **Lothy F. Casim, Ph.D.**
b. Dean/Director of the Academic Unit	: **Philip Lester P. Benjamin, Ph.D.**
c. President of the Institution	: **Jonald L. Pimentel, Ph.D.**
5. Legal Basis of the Program/ BOR or BOT Resolution	: **Res. No. 29 s. 1997**
6. Accreditation visit being applied	: **Level IV, 4th survey**
7. Present accreditation status and its	: **Level III Reaccredited (Qualified for Level IV)**

8. Date of Visit: June 18-20, 2025

The **Master of Science in Biology Program of the University of Southern Mindanao** is offered under the Biological Science Department of the College of Science and Mathematics. It is under the mandate of CHED Memorandum No. 06 Series of 2011.

The MS Biology is an advanced level program for student aspiring to work or currently working in an academic, research or industrial setting.

The program on the contrary, is an all-coursework program with special problem that gives students exposure to research. The program is appropriate for students who are teaching secondary and college-level Biology.

The Program aims to develop student with critical thinking and independent research towards the advancement of knowledge in Biology and develop professional leadership in specialized areas of Biology.

The MS Biology Program of the University of Southern Mindanao was awarded Level III by the Accrediting Agency for Chartered Colleges and Universities of the Philippines, Inc. (AACCUP). The AACCUP re-accredited the program, and it qualified for Level IV.

The summary of ratings of the 4 areas evaluated shows that the MS Biology Program qualifies for Level IV.

AREA	**MEAN**
I. Research	5.00
II. Performance of Graduates	5.00
III. Community Service	3.83
IV. International Linkages and Consortia	3.75
V. Planning Process	5.00
Grand Mean	**4.52**

CRITERIA TO PASS THIS LEVEL:

Recommendations to the Institution:

		Mean Rating	**Please check**		
1	Qualified in the level IV		Yes	No	NA
	Minimum Grand Mean	4.50 or higher	√		
	Minimum Area Mean	4.00 or higher		√	
2	Mandatory Recommendations				
	Complied with all recommendations to be				
	Complied with before award of Level IV			√	

Mandatory Recommendation (to be complied before the award)	**Enhancement** (may be complied with after the award)	**Action taken**	**% Compliance**
3. The institution has been engaging in various partnerships over time. It is imperative that every collaboration be made official through a Memorandum of Agreement (MOA) or Memorandum of Understanding (MOU). This requirement ensure that all parties are clear on their responsibilities, are protected legally, and held accountable throughout the partnership.	Strengthen national and international linkages and consortia and involve more MS Biology faculty and graduate students as well.	The Department of Biological Sciences has significantly strengthened and expanded its national and international linkages by developing **active, research-driven partnerships and participation in international scientific networks and consortia**. These collaborations extend beyond institutional affiliation and include joint research, co-publication, data sharing, graduate supervision, capacity-building, and co-development of scientific knowledge and conservation initiatives. The Department has established collaborations with institutions and networks across Asia, Europe, Australia, and the Americas and has generated more than **50 joint publications**, while its faculty have engaged with more than **100 international co-authors**. Significantly, the Department has progressed from being merely a participant in international collaborations to taking **leadership roles in global research networks and consortia**. A major example is the **DarkCideS Consortium**, co-led by faculty of the Department of Biological Sciences, in the person of **Dr. Krizler C. Tanalgo,** and coordinated through the USM Ecology and Conservation (Eco/con) Research Laboratory. The consortium comprises **36 collaborators from more than 20 countries across six continents** and facilitates global data sharing, research collaboration, and	100%

		conservation action on cave and subterranean biodiversity. The Department has likewise increased the participation of **MS Biology students in internationalization activities**, particularly through research presentations and attendance at international scientific conferences. These engagements enable graduate students to receive feedback from experts, exchange scientific ideas, strengthen research and communication competencies, develop professional networks, and explore potential collaborations with researchers from other countries. **Evidence of Compliance:** *Agreements of Collaboration; international research project documents; joint publications; international conference programs/certificates; photographs; student research presentations; award and certificate of recognition.*	
4. While documentary evidences for international linkages have been shown in terms of email correspondences, letters, online meetings and the like, it is still imperative to show that MOAs have been forged between the University and among institutions/entities that would formalize and ensure sustainability of these endeavors. The presence of these MOAs is still being one of the mandatory requirements during the last accreditation visit.		In response to the recommendation to formalize international collaborations, the Department has strengthened the documentation of its partnerships through **formal Agreements of Collaboration, MOA, and other documented collaborative arrangements** with international universities, research institutes, laboratories, programs, and consortia. These agreements provide clearer frameworks for sustained research cooperation, knowledge exchange, co-development of research outputs, mentoring, data sharing, and other collaborative activities.	100%

		Among the documented/formalized collaborations highlighted in the Department's records are: 1. **UC Louvain, Belgium** – An Agreement of Collaboration formalizes the partnership involving **Professor Krizler Tanalgo and an ERC**-funded international project on biodiversity, local knowledge, and zoonoses in Austronesia. The collaboration includes scientific advisory functions, research cooperation, academic exchange, and co-supervision of graduate students and postdoctoral researchers. The documentary evidence such as an **Agreement of Collaboration and certification of the successful partnership between USM-Biology and UC Louvain** are presented after this table. 2. **Molecular Ecology Group (MEG), Water Research Institute–National Research Council, Verbania, Italy** – The Department plays a leadership role in this established global consortium, which maintains a formalized international database and collaborative research network focused on cave and subterranean biodiversity. The consortium is co-led by Department faculty and represents a sustainable international network rather than a one-time research engagement. Documentary evidence establishes collaboration between USM, represented by **Dr. Tanalgo,** and the Molecular Ecology Group	

		through **Dr. Stefano Mammola**, supporting continuing international research collaboration in biodiversity and related ecological research. 3. **Locally-led East Asian Flyway Acoustics (LEAFA) Program–Cornell University, USA** – The Department participates in this international research initiative through **Dr. John Aries G. Tabora**. The collaboration supports the development of a regional conservation program for migratory birds using participatory research and acoustic monitoring approaches. Through this collaboration the department was provided with 2 song meter micro2 recording devices and 1 external hard drive that were used by the students in the conduct of their research study and field lab activities. 4. **University of Southern Queensland/Australian Collaboration** – An Agreement of Collaboration involving Prof. Richard Dien D. Altarez and the USM Ecology and Conservation Research Laboratory, represented by Prof. Angelo R. Agduma, provides documentary evidence of formal research collaboration. The related research focuses on coastal forest mapping, advanced computational approaches, biomass estimation, and environmental assessment. 5. **The Laboratory of Animal Ecology and Evolution**, **University of Naples Federico II Naples, Italy** and the USM – Ecology and Conservation Research laboratory, represented by	

		Dr. Krizler C. Tanalgo. These linkages have resulted in co-authored publications in leading scientific journals and the development of global datasets on pressing ecological themes such as evolutionary traps, urban biodiversity, and species behavior. Many of these efforts have also contributed to long-term research partnerships and extensive data-sharing frameworks. These formalized and sustained collaborations demonstrate the Department's substantial response to the previous recommendation by moving international engagement from primarily informal professional connections toward **documented, structured, output-oriented, and sustainable partnerships**. **Evidence of Compliance:** *Copies of Agreements of Collaboration; joint research outputs; co-authored publications; records of meetings and research activities; certificates and other supporting documents.*	
5. It is likewise important that not only the Department faculty be involved in international linkages but its graduate students as well.		The Department has deliberately expanded internationalization opportunities to **MS Biology students and graduates**, recognizing that the benefits of international linkages must extend beyond faculty members to graduate education. MS Biology students are encouraged and supported to present their research at international scientific conferences, interact with international and national experts, participate in	100%

		exchanges of scholarly ideas in conferences, and establish professional networks that may develop into future research collaborations. Concrete evidence includes the participation of **Ms. Florilyn Diliman** with an MS Biology faculty member in the 4th International Convention of the Philippine Society of Parasitology in 2024; the research presentations of **Mr. Muamar S. Pamlian and Ms. Jazel D. Fernandez**, together with their thesis adviser, during the International Conference of the Philippine Society of Parasitology in Baguio in 2025; and the participation of Mr. Pamlian and an MS Biology faculty member in the **ASEAN Congress of Tropical Medicine and Parasitology International Conference in 2026**. Mr Jobert Ellaga also attended the International Symposium and 43rd Annual Meeting of the Association of Systematic Biologists of the Philippines on June 2-5, 2026 with Dr. Cherie C. Mangaoang. The quality and competitiveness of MS Biology student research were further **demonstrated in their Scopus/WOS indexed publications** and when **Mr. Pamlian won 2nd Place in the Best Poster Competition under the Professional Category**, competing with participants from universities in the Philippines and abroad. Such achievements demonstrate that internationalization is already producing tangible outcomes at the graduate-student level by strengthening research	

		competence, scientific communication, professional confidence, networking, and the international visibility of the MS Biology Program. **Evidence of Compliance:** Publication papers, *Conference certificates of participation/presentation; award certificates; photographs; and other records demonstrating graduate-student participation in international scientific activities.*	

EVIDENCE OF COMPLIANCE:

1. Agreement of Collaboration and certification of the successful partnership between USM-Biology (Dr. Krizler C. Tanalgo) and UC Louvain:

UCLouvain laap INCAL Department of Biological Sciences

Agreement of Collaboration/Accord de Collaboration

This 'Agreement of Collaboration' affirms the mutual commitment between the **Laboratoire d'anthropologie Prospective (LAAP)** at the **Université Catholique de Louvain (UCLouvain)**, represented by **Professor Frédéric Laugrand, PhD**, and the **Ecology and Conservation Research Laboratory (Eco/Con Lab), Department of Biological Sciences** at the **University of Southern Mindanao, Philippines,** represented by **Professor Krizler C. Tanalgo, PhD**.

Professor Laugrand serves as the Director of the European Research Council-Interspecific project based, and Professor Tanalgo serves as a member of the Scientific Advisory Board.

Both institutions share common research interests in **conservation biology** and **anthropology** and recognise the value of equitable international collaboration to address global and local environmental challenges.

Through this partnership, both parties agree to establish, promote, and engage in the following:

1. **Joint research activities —** Co-development and implementation of collaborative research projects, particularly focussing on socioecological systems, anthropological, biodiversity and conservation studies in Mindanao, Philippines;
2. **Knowledge sharing and capacity building** — Exchange of scientific expertise, field data, and best practices through seminars, workshops, and co-organised symposiums;
3. **Visiting Professorships and research exchanges** — Opportunities for faculty members and researchers to visit each institution to contribute to teaching, mentoring, logistic support, and collaborative research, and;
4. **Student mobility and training** — Facilitation of academic exchange, internships, and research training opportunities for students of both institutions, fostering experiential and intercultural learning.

This collaboration is built on the principles of mutual respect, equity and scientific integrity and aims to strengthen the collective contribution of both institutions to advance anthropological knowledge and conservation practice in the Philippines, Belgium and beyond.

CERTIFIED TRUE COPY:
MARGIE N. BUTUAN-GALANG
Chief Administrative Officer
University of Southern Mindanao
Date:

UCLouvain laap INCAL Department of Biological Sciences

This Letter of Collaboration does not constitute a legally binding agreement but reflects a shared intent to cooperate in the future. Any specific projects or activities will be formalised through separate agreements as needed.

Signed on this 15th of October 2025 in UCLouvain, Louvain-la-Neuve, Belgium

Professor Frédéric Laugrand, PhD
Director, Laboratoire d'anthropologie Prospective (LAAP), Université Catholique de Louvain, Louvain-la-Neuve, Belgium

Professor Krizler C. Tanalgo, PhD
Research Lab Head, Ecology and Conservation Research Laboratory (Eco/Con Lab), Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Philippines

Republic of the Philippines
Kabacan, Cotabato
UNIVERSITY OF SOUTHERN MINDANAO
Tel. No. 064-572-2138
email address: op@usm.edu.ph

CERTIFICATION OF SUCCESSFUL PARTNERSHIP INITIATION/IMPLEMENTATION

I hereby certify that the partnership between **University of Southern Mindanao/Department of Biological Sciences/Eco/Con Lab** and **Institut des Civilisations, Arts et Lettres (INCAL) of the Université Catholique de Louvain, Belgium** was initiated and implemented successfully by **KRIZLER C. TANALGO**

This partnership, forged with the intention of fostering collaboration and mutual growth, was conceived and brought to fruition through the dedicated efforts and vision of our esteemed faculty members. Their unwavering commitment to excellence, innovation, and community engagement has played a pivotal role in achieving the objectives set forth during the partnership's inception.

Key Achievements of the Partnership:

Joint Research Initiatives: Our faculty collaborated on various research projects, leading to significant contributions to their areas of expertise and advancing the boundaries of knowledge.

Publication and Academic Recognition: The joint efforts of our faculty led to several notable publications and academic recognitions, further elevating the reputation of both institutions.

As the President of the University of Southern Mindanao, I take immense pride in acknowledging the achievements and dedication of our faculty members. Their passion for excellence and commitment to the core values of our institution have played a vital role in ensuring the success of this partnership.

With this certification, I affirm that the partnership between University of Southern Mindanao and **Institut des Civilisations, Arts et Lettres (INCAL) of the Université Catholique de Louvain, Belgium** has been successfully initiated and implemented by our faculty member, and I look forward to witnessing its continued growth and impact in the years to come.

Reviewed by:

DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development, and Extension

Certified by:

JONALD L. PIMENTEL, PhD
SUC President IV
University of Southern Mindanao

2. Agreement of Collaboration and certification of the successful partnership between USM as represented by Dr Krizler C. Tanalgo and the Molecular Ecology Group of Water Research Institute, National Research Council, Verbania, Italy thru Dr. Stefano Mammola.

Agreement of Collaboration/ Accordo di Collaborazione

This Agreement of Collaboration affirms the mutual commitment between the **DarkCideS Project at the Ecology and Conservation Research Laboratory (Eco/Con Lab), Department of Biological Sciences at the University of Southern Mindanao (USM), Philippines**, represented by **Dr. Krizler C. Tanalgo**, and the **Molecular Ecology Group (MEG), Water Research Institute, National Research Council (IRSA-CNR), Verbania, Italy,** represented by **Dr. Stefano Mammola.**

Both institutions share strong research interests in **bat ecology, subterranean biodiversity, and conservation**, and recognise the importance of global scientific collaboration in advancing understanding and protection of subterranean ecosystems and their associated fauna.

Through this partnership, both parties agree to collaborate in the following areas:

1. **Exchange of ideas and intellectual dialogue** – Engage in scientific discussions, knowledge exchange, and co-learning activities to advance the field of subterranean conservation, with a focus on bats and subterranean ecosystems.
2. **Data sharing and FAIR Access** – Facilitate the sharing and open (FAIR) access of global biodiversity datasets related to bats and other subterranean fauna, ensuring that data mobilisation and use adhere to international data standards and equitable attribution.
3. **Joint authorship and research outputs** – Collaboratively design, conduct, and publish joint research papers and reports arising from shared scientific efforts, recognising all contributing authors and institutions fairly.

This collaboration is founded on the principles of mutual respect, equity, open science, and scientific integrity, and aims to contribute to the global understanding and protection of subterranean ecosystems through research, data sharing, and international cooperation.

CERTIFIED TRUE COPY:
MARGIE N. BOTUAN-GALANG
Chief Administrative Officer
University of Southern Mindanao
Date:

pg. 1/2

DarkCideS 1.0

Department of Biological Sciences

This Agreement of Collaboration is not legally binding but represents a shared intent to collaborate in good faith. Specific research activities or outputs resulting from this partnership may be formalised through separate agreements as appropriate.

Signed on this 21th of October 2025, in Verbania, Italy, and Kabacan, Cotabato, Philippines [online].

Stefano Mammola, PhD

Senior Researcher at the Water Research Institute, National Research Council (IRSA-CNR), Verbania, Italy

Krizler C. Tanalgo, PhD

Ecology and Conservation Research Laboratory (Eco/Con Lab), Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Philippines

Republic of the Philippines
Kabacan, Cotabato
UNIVERSITY OF SOUTHERN MINDANAO
Tel. No. 064-572-2138
email address: op@usm.edu.ph

CERTIFICATION OF SUCCESSFUL PARTNERSHIP INITIATION/IMPLEMENTATION

I hereby certify that the partnership between **University of Southern Mindanao/Department of Biological Sciences/Eco/Con Lab** and **Water Research Institute, National Research Council, Italy** was initiated and implemented successfully by **KRIZLER C. TANALGO**

This partnership, forged with the intention of fostering collaboration and mutual growth, was conceived and brought to fruition through the dedicated efforts and vision of our esteemed faculty members. Their unwavering commitment to excellence, innovation, and community engagement has played a pivotal role in achieving the objectives set forth during the partnership's inception.

Key Achievements of the Partnership:

Joint Research Initiatives: Our faculty collaborated on various research projects, leading to significant contributions to their areas of expertise and advancing the boundaries of knowledge.

Publication and Academic Recognition: The joint efforts of our faculty led to several notable publications and academic recognitions, further elevating the reputation of both institutions.

As the President of the University of Southern Mindanao, I take immense pride in acknowledging the achievements and dedication of our faculty members. Their passion for excellence and commitment to the core values of our institution have played a vital role in ensuring the success of this partnership.

With this certification, I affirm that the partnership between University of Southern Mindanao and **Water Research Institute, National Research Council, Italy** has been successfully initiated and implemented by our faculty member, and I look forward to witnessing its continued growth and impact in the years to come.

Reviewed by:

DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development, and Extension

Certified by:

JONALD L. PIMENTEL, PhD
SUC President IV
University of Southern Mindanao

3. Proof of Collaboration between Ornithology Laboratory of Cornell University, USA thru the Locally- led East Asian Flyway Acoustics (LEAFA) Program and USM-Biology as represented by Dr. John Aries G. Tabora:

Republic of the Philippines
UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
ols@usm.edu.ph

OFFICE OF LEGAL SERVICES

November 28, 2025

JONALD L. PIMENTEL, PhD
President
University of Southern Mindanao
Kabacan, Cotabato

RE: Approval of "MEMORANDUM OF UNDERSTANDING" with LOCALLY-LED EAST ASIAN FLYWAY ACOUSTICS (LEAFA)

RECOMMENDED ACTION: FOR SIGNING OF "MEMORANDUM OF AGREEMENT"

Sir:

Attached herein is the "Memorandum of Agreement" between the University of Southern Mindanao (USM) and Locally-Led East Asian Flyway Acoustics (LEAFA) is respectfully endorsed for approval and signing. This Agreement aims to support conservation and bird studies for migratory bird studies.

This Agreement will strengthen the research and ecological efforts in research and scientific exchange. It also supports capacity-building in acoustic monitoring, ecology, and environmental stewardship which promotes our university's commitment to environmental and regional biodiversity conservation.

The partnership with LEAFA offers a valuable opportunity to engage in acoustics-based research for the protection and monitoring of flyway species in the East Asian region, which would enrich our academic and scientific capacities, and provide our students and faculty with meaningful research and conservation exposure.

The Parties agree that this Memorandum of Agreement (MOA) does not constitute a funding obligation by either Party. As per certification by the Finance Management Services Office, there is no financial responsibility from both parties. Each Party shall bear its own costs in connection with the activities under this MOA, unless and until a separate written agreement is executed.

The provisions of the Memorandum of Agreement are found to be consistent with the objectives of the LEAFA and USM in fostering ecological conservation. It affirms that this collaboration aligns with our institution's mission and strategic goals, particularly in the areas of conservation, biodiversity, international cooperation and ecological studies.

Very truly yours,

ATTY. SUNNY KYE M. NOGALO
Director

"UNITY IN DIVERSITY AND
SUSTAINABLE DEVELOPMENT IN
MINDANAO THROUGH QUALITY AND RELEVANT EDUCATION."

USM-SYS-F70-Rev.2.2023.12.29

Republic of the Philippines
UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato

Management System ISO 9001:2015 TÜVRheinland CERTIFIED

FINANCIAL MANAGEMENT SERVICES OFFICE

CERTIFICATION

This is to formally certify that the following activity/program/project has undergone preliminary review and evaluation by the undersigned:

Title: East Asian-Australasian Flyway
Partner Agency: Locally-Led East Asian Flyway Acoustics (LEAFA) Program
☐ Government ☑ Private
Inclusive Dates of Implementation: Effective upon signing of MOA until completion of the pilot project
Proponent/s: John Aries G. Tabora

Based on the submitted documents and evaluation conducted, the undersigned hereby attests that the activity/program/project is classified as follows (please mark accordingly):

☑ A. No funding requirement
☐ B. Funding availability confirmed, in the amount of:
Amount in words: ____
Amount in figures: ____
Source of Fund: ☐ Fund 01 ☐ Fund 05 – Fiduciary ☐ Fund 07 ☐ Fund 05 – Tuition ☐ Fund 05 – IGP
☐ C. Funds anticipated for crediting to the USM Account on ____, in the amount of:
Amount in words: ____
Amount in figures: ____
Source of Fund: ☐ Fund 01 ☐ Fund 05 – Fiduciary ☐ Fund 07 ☐ Fund 05 – Tuition ☐ Fund 05 – IGP

Additionally, for classifications (B) and (C), it is hereby affirmed that the proponent/s have duly completed and submitted the following mandatory budgetary and procurement documents (please mark accordingly):

☐ Special Budget (SB)
☐ Line-item Budget (LIB) *from funding agency (if applicable)*
☐ Project Procurement Management Plan (PPMP)
☐ Official Receipt (OR) *for funds received (issued by USM Cashier's Office)*
OR Number: ____
Amount in words: ____
Amount in Figures: ____
Particulars (i.e., period covered for the release): ____

This certification is issued on November 25, 2025 for the purpose of facilitating the endorsement and approval of the aforementioned activity/program/project. Utilization and disbursement of funds, where applicable, shall remain subject to the approval and governing policies of the USM Board of Regents.

Digitally signed by Vildac Jay-R Groza
JAY-R G. VILDAC, CPA, DBA
FMS Director

"UNITY IN DIVERSITY AND
SUSTAINABLE DEVELOPMENT IN
MINDANAO THROUGH QUALITY AND RELEVANT EDUCATION."

USM-SYS-P70-Rev.2.2023.12.29

Republic of the Philippines
UNIVERSITY OF SOUTHERN MINDANAO
Kabacan, Cotabato
email address: usmvprde@usm.edu.ph

UNIVERSITY RESEARCH, DEVELOPMENT and EXTENSION COMMITTEE

RESOLUTION AD REFERENDUM

Resolution No. 76
Series of 2025

"ENDORSING THE MEMORANDUM OF UNDERSTANDING BETWEEN THE LEAFA AND USM"

Endorsing the Memorandum of Understanding between the Locally-Led East Asian Flyway Acoustics Program (LEAFA) and University of Southern Mindanao (USM) for collaboration on research development, develop a high-quality dataset for monitoring of migratory birds in Southeast Asia.

APPROVED

X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X

CERTIFIED TRUE AND CORRECT:

JANICE M. BANGOY
URDEC Secretariat

ATTESTED BY:

Digitally signed by Magbanua Glyn Gabano
GLYN G. MAGBANUA
Director, ESO

LYDIA C. PASCUAL
Director, RDO

FLORENCE ROY P. SALVAÑA
Director, RPSO

JALALODEN B. MAROHOM
Director, IPTTBDO

TAMIE C. SOLPOT
Director, PICRI

JURHAMID C. IMLAN
Director, USMARDC

DEBBIE MARIE B. VERZOSA
VPRDE, and URDEC Vice-Chairperson

BRYAN LLOYD P. BRETAÑA
Director, OIA

JONALD L. PIMENTEL
USM President and URDEC Chairperson

"UNITY IN DIVERSITY AND
SUSTAINABLE DEVELOPMENT IN
MINDANAO THROUGH QUALITY AND RELEVANT EDUCATION."

PERKUMPULAN BISA INDONESIA
Gondang Legi, RT.01/RW.13, Desa Sariharjo,
Kecamatan Ngaglik, Kabupaten Sleman,
Daerah Istimewa Yogyakarta 55581
INDONESIA

No. : 025/BISA-adm/LEAFA/II/2026
Subject : Year 2 Locally-led East Asian Flyway (LEAFA) Program

Dear John Aries G. Tabora,

It is my pleasure to accept your application and invite you to participate in the second year of the Locally-led East Asian Flyway (LEAFA) Program to be held from September 1, 2025, to September 1, 2026.

To enable your participation, two (2) Song Meter Micro 2 recording devices and one (1) external hard drive for data storage will be provided. The equipment will remain the property of the LEAFA Program for the duration of the program. Upon successful completion of all program requirements, ownership of the Song Meter units will be transferred to the LEAFA partners. LEAFA partners are encouraged to ensure the proper use and routine care of these items, and in the event of loss, theft or damage, you are advised to notify the organizer as soon as possible. This, however, does not guarantee replacement or reimbursement.

Equipment will be shipped to one designated address per country, with local coordination and distribution managed by the LEAFA partners within the country. Any import duties, taxes, or fees will be applied per country shipment, rather than per individual partner. We can cover up to US $ 187 per country in local taxes or fees associated with your receipt of the Song Meter units; any cost exceeding this amount will be the responsibility of the awardee. We strongly encourage you to work to get a tax exemption for this. Please let us know as soon as possible if we should include a letter for tax exemption with the recorder shipment.

The LEAFA Program will also provide a lump sum of US $700 for field work and associated costs, including internal shipping of recorders from each country's recipient, research assistants, travel to the field, SD cards, and/or batteries; please confirm with us for any other expenditure outside of this list. All field support expenditures must be incurred within the program period (September 1, 2025-September 1, 2026). Recipients are expected to retain all receipts related to field support expenses and fill out the provided expenditure form upon completion of the program. Please note that any wire transfer or bank fees will be deducted from the field support allocation.

Your eligibility to retain the equipment is dependent on your successful completion of the second year of the LEAFA Program, which will be evaluated quarterly. Failure to successfully fulfil the minimum participation requirements of the program may require the return of this equipment.

Specifically, your participation in the program will entail:

- Collect data on the agreed-upon schedule, archive the data promptly, and share the associated metadata and a summary of detections quarterly.
- Provide a video documenting your progress by April 1, 2026, in accordance with a video guideline that will be shared by the organizer.

PERKUMPULAN BISA INDONESIA
Gondang Legi, RT.01/RW.13, Desa Sariharjo,
Kecamatan Ngaglik, Kabupaten Sleman,
Daerah Istimewa Yogyakarta 55581
INDONESIA

- Submit a mid-program and final progress report, following the template provided by the LEAFA Program.
- Submit all manually verified detections for the collective analysis session by March 15, 2026.
- Attend and actively participate in the monthly organized sessions and the working group sessions.
- Meet the identified goals as outlined by the working groups.
- Respond promptly to emails and communications about the program (within approximately one week) unless in the field or on leave.
- Acknowledge the grant in talks and publications using the following format: We acknowledge the Locally Led East Asian Flyway (LEAFA) Program led by BISA Indonesia, K. Lisa Yang Center for Conservation Bioacoustics, Cornell Lab of Ornithology, Cornell University, and Universiti Malaysia Terengganu. Funding for this project comes with generous support from the Cornell Lab of Ornithology through the H. Elliot McClure Fund for the Research and Conservation of Birds in Asia, as well as Arm and WILDLABS through the WILDLABS Award 2025.

To indicate your acceptance of this invitation and its terms, please sign below and return this letter to Asman Adi Purwanto (asman@bisaindonesia.or.id with cc to pa429@cornell.edu) by February 5, 2026.

Regards,

Asman Adi Purwanto,
Executive Director

I accept this invitation.

Signature/Name: John Aries G. Tabora Date: 04/ /2026

For office use only. After the program completion, the Executive Director should sign below to indicate that all requirements were met.

Certification/Approval:_____ Date:_____

info.bisaina@gmail.com bisaindonesia.or.id

4. An Agreement of Collaboration involving Prof. Richard Dien D. Altarez of University of Southern Queensland, Australia and the USM Ecology and Conservation (Eco/con) Research Laboratory, represented by Prof. Angelo R. Agduma:

Department of Biological Sciences

UNIVERSITY OF SOUTHERN QUEENSLAND

Agreement of Collaboration

This *Agreement of Collaboration* affirms the mutual commitment between **Assoc. Prof. Angelo R. Agduma**, Principal Investigator, Ecophysiology in a Changing Environment Group, Ecology and Conservation Research Laboratory (Eco/Con Lab), University of Southern Mindanao, Philippines and **Prof. Richard Dein D. Altarez, PROF**, Corps of Professors, Philippine Military Academy, Armed Forces of the Philippines/PhD candidate, University of Southern Queensland, Australia.

Through this partnership, both parties express their shared intention to establish, promote, and undertake collaborative initiatives to:

1. Co-develop, implement, and disseminate collaborative research projects, particularly in the fields of ecology, biodiversity, environmental science, remote sensing, and applications of artificial intelligence, including the co-authorship of resulting scholarly publications and other research outputs; and
2. Exchange of scientific expertise, research data, methodologies, and best practices through lectures, seminars, workshops, training activities, and jointly organized symposia to strengthen research capacity and foster academic collaboration.

This collaboration is founded on the principles of mutual respect, equity, transparency, and scientific integrity. It aims to strengthen the collective contributions of both parties toward advancing scientific knowledge, promoting biodiversity conservation, and supporting evidence-based environmental management in the Philippines and beyond.

This is intended solely as an expression of the parties' shared commitment to collaborate and does not create any legally binding obligations. Any specific research projects, funding arrangements, intellectual property matters, or other collaborative activities arising from this partnership shall be governed by separate written agreements executed by the parties as appropriate.

Signed this 25th day of July 2024 in Baguio City, Philippines.

ANGELO R. AGDUMA
Ecology and Conservation Research Laboratory (Eco/Con Lab), University of Southern Mindanao, Philippines

RICHARD DEIN D. ALTAREZ, PROF
Corps of Professors, Armed Forces of the Philippines

pg. 1/1

Republic of the Philippines
Kabacan, Cotabato
UNIVERSITY OF SOUTHERN MINDANAO
Tel. No. 064-572-2138
email address: op@usm.edu.ph

CERTIFICATION OF SUCCESSFUL PARTNERSHIP INITIATION/IMPLEMENTATION

I hereby certify that the partnership between **University of Southern Mindanao/Department of Biological Sciences/Eco/Con Lab** and **Philippine Military Academy, Armed Forces of the Philippines/University of Southern Queensland, Australia** was initiated and implemented successfully by **ANGELO R. AGDUMA.**

This partnership, forged with the intention of fostering collaboration and mutual growth, was conceived and brought to fruition through the dedicated efforts and vision of our esteemed faculty members. Their unwavering commitment to excellence, innovation, and community engagement has played a pivotal role in achieving the objectives set forth during the partnership's inception.

Key Achievements of the Partnership:

Joint Research Initiatives: Our faculty collaborated on various research projects, leading to significant contributions to their areas of expertise and advancing the boundaries of knowledge.

Publication and Academic Recognition: The joint efforts of our faculty led to several notable publications and academic recognitions, further elevating the reputation of both institutions.

As the President of the University of Southern Mindanao, I take immense pride in acknowledging the achievements and dedication of our faculty members. Their passion for excellence and commitment to the core values of our institution have played a vital role in ensuring the success of this partnership.

With this certification, I affirm that the partnership between University of Southern Mindanao and **Philippine Military Academy, Armed Forces of the Philippines/University of Southern Queensland, Australia** has been successfully initiated and implemented by our faculty member, and I look forward to witnessing its continued growth and impact in the years to come.

Reviewed by:

DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development, and Extension

Certified by:

JONALD L. PIMENTEL, PhD
SUC President IV
University of Southern Mindanao

"UNITY IN DIVERSITY AND
SUSTAINABLE DEVELOPMENT IN
MINDANAO THROUGH QUALITY AND RELEVANT EDUCATION."

Remote Sensing Applications: Society and Environment 39 (2025) 101647

Contents lists available at ScienceDirect

Remote Sensing Applications: Society and Environment

journal homepage: www.elsevier.com/locate/rsase

Multi-model convolutional neural network architectures for coastal forest extent and aboveground biomass estimation

Angelo R. Agduma [a,b], Richard Dein D. Altarez [c,d,*]

[a] Ecophysiology in a Changing Environment Group, Ecology and Conservation Research Laboratory (Eco/Con), Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Kabacan, 9407, Cotabato, Philippines
[b] Graduate School, University of Southern Mindanao, Kabacan, 9407, Cotabato, Philippines
[c] University of Southern Queensland, Institute for Life Sciences and the Environment, Toowoomba, QLD, 4350, Australia
[d] Office of the Dean, Corps of Professors, Armed Forces of the Philippines, Cubao, Quezon City, 1109, Philippines

ARTICLE INFO

Keywords:
AGB
CNN
LAI
Coastal forest
U-net

ABSTRACT

Mapping coastal forests through large-scale remote sensing remains challenging, despite extensive local, national, and global efforts. In particular, Sarangani Bay Protected Seascape (SBPS) in the Philippines has been largely overlooked in both national and global coastal forest mapping initiatives. To address this gap, we evaluated the performance of three convolutional neural network (CNN) models, U-Net, DeepLabV3, and PSPNet, in identifying coastal forests within SBPS. These forested areas detected were subsequently analyzed for leaf area index (LAI), which was then used to estimate aboveground biomass (AGB). Among the models tested, U-Net demonstrated the highest accuracy, achieving an overall accuracy of 92.66 %. In contrast, DeepLabV3, while the fastest to train, yielded lower accuracy. AGB estimates revealed that the municipalities of *Glan* and *Maasim* had the highest AGB, with 2582.43 Mg ha^{-1} and 1260.57 Mg ha^{-1}, respectively, while *Alabel* recorded the lowest at 27.27 Mg ha^{-1}. Although distinguishing true mangroves from non-true mangrove classes in coastal forests remains a limitation, the integration of remote sensing and deep learning offers strong potential for enhancing the accuracy and efficiency for land use and land cover classification, as well as AGB estimation.

1. Introduction

Coastal forests, including mangroves and beach forests, play critical roles in protecting shorelines, supporting biodiversity, and delivering ecological benefits (Das et al., 2022; Naskar et al., 2023). Mangrove forests alone span approximately 147,000 km^2 worldwide (Bunting et al., 2022). While capable of rapidly colonizing new environments, coastal forests are susceptible to destruction by anthropogenic and natural forces (Long et al., 2016; Primavera, 2004, 2006; Primavera et al., 2004; Primavera et al., 2016a). Significant reductions in the extent of global mangrove forests have historically been documented, and the greatest expanse of mangrove loss has been recorded in North and Central America, the Caribbean, and Southeast Asia (Bunting et al., 2022). These losses are immense (Romañach et al., 2018), therefore, restoration, protection, and the halt of all global losses of mangrove ecosystems are fundamental (Dabalà et al., 2023; Leal and Spalding, 2022).

Mangroves have been better studied (Agduma et al., 2024) than beach forest species (Romeroso et al., 2021; Sabulao, 2020) in the

* Corresponding author. University of Southern Queensland, Institute for Life Sciences and the Environment, Toowoomba, QLD 4350, Australia.
E-mail address: u1135486@umail.usq.edu.au (R.D.D. Altarez).

https://doi.org/10.1016/j.rsase.2025.101647
Received 30 April 2025; Received in revised form 2 June 2025; Accepted 26 June 2025
Available online 27 June 2025

5. Agreement of collaboration between the Laboratory of Animal Ecology and Evolution and the USM – Ecology and Conservation Research laboratory, represented by Dr. Krizler C. Tanalgo:

Agreement of Collaboration/ Accordo di Collaborazione

This 'Agreement of Collaboration' affirms the mutual commitment between the **Lab of Animal Ecology and Evolution** at the **Dipartimento di Agraria, Università degli Studi di Napoli Federico II**, represented by **Professor Danilo Russo, PhD**, and the **Ecology and Conservation Research Laboratory (Eco/Con Lab), Department of Biological Sciences** at the **University of Southern Mindanao, Philippines,** represented by **Professor Krizler C. Tanalgo, PhD**.

Both institutions share common research interests in the **bat ecology, behaviour, and conservation** and recognise the value of equitable international collaboration to address global and local environmental challenges.

Through this partnership, both parties agree to establish, promote, and engage in the following:

1. **Joint field and analytical research** focused on bat ecology, behaviour, and conservation in diverse ecological and cultural contexts.
2. **Knowledge exchange** through seminars, symposia, and academic forums that promote the sharing of research findings, methodologies, and best practices.
3. **Joint publication and open data collaboration**, including the co-development of scientific manuscripts, datasets, and reports that align with FAIR and ethical research principles.
4. **Capacity building and academic exchange**, involving possible **student and faculty mobility**, mentorship, and co-supervision of research projects.

This collaboration is built on the principles of mutual respect, equity and scientific integrity and aims to strengthen the collective contribution of both institutions to advance anthropological knowledge and conservation practice in the Philippines, Belgium and beyond.

CERTIFIED TRUE COPY:
MARGIE N. MOTUAN-GALANG
Chief Administrative Officer
University of Southern Mindanao
Date:_____

Republic of the Philippines
Kabacan, Cotabato
UNIVERSITY OF SOUTHERN MINDANAO
Tel. No. 064-572-2138
email address: op@usm.edu.ph

CERTIFICATION OF SUCCESSFUL PARTNERSHIP INITIATION/IMPLEMENTATION

I hereby certify that the partnership between **University of Southern Mindanao/Department of Biological Sciences/Eco/Con Lab** and **University of Naples Federico II Naples, Italy** was initiated and implemented successfully by **KRIZLER C. TANALGO**

This partnership, forged with the intention of fostering collaboration and mutual growth, was conceived and brought to fruition through the dedicated efforts and vision of our esteemed faculty members. Their unwavering commitment to excellence, innovation, and community engagement has played a pivotal role in achieving the objectives set forth during the partnership's inception.

Key Achievements of the Partnership:

Joint Research Initiatives: Our faculty collaborated on various research projects, leading to significant contributions to their areas of expertise and advancing the boundaries of knowledge.

Publication and Academic Recognition: The joint efforts of our faculty led to several notable publications and academic recognitions, further elevating the reputation of both institutions.

As the President of the University of Southern Mindanao, I take immense pride in acknowledging the achievements and dedication of our faculty members. Their passion for excellence and commitment to the core values of our institution have played a vital role in ensuring the success of this partnership.

With this certification, I affirm that the partnership between University of Southern Mindanao and **University of Naples Federico II Naples, Italy** has been successfully initiated and implemented by our faculty member, and I look forward to witnessing its continued growth and impact in the years to come.

Reviewed by:

DEBBIE MARIE B. VERZOSA, PhD
Vice President for Research, Development, and Extension

Certified by:

JONALD L. PIMENTEL, PhD
SUC President IV
University of Southern Mindanao

6. **PARTICIPATION OF MS BIOLOGY STUDENTS AND MS BIOLOGY FACULTY IN INTERNATIONALIZATION ACTIVITIES:**
   A. Dr. Lothy F Casim and her advisee Miss Florilyn Diliman attended and presented their papers in the 4th International Conference of Philippine Society of Parasitology held in the University of the Philippines, Los Baños Laguna. Both also participated in the pre-conference workshop co-organized by the Parasitology Department of UP-Manila and PSP.

COLLEGE OF PUBLIC HEALTH
UNIVERSITY OF THE PHILIPPINES MANILA
SEAMEO TROPMED Philippines
Regional Centre for Public Health, Hospital Administration, Environmental and Occupational Health
in collaboration with
PHILIPPINE SOCIETY OF PARASITOLOGY, INC.

award this

Certificate of Training

To

LOTHY F. CASIM

for successfully completing the

SILIP. SURVEILLANCE OF LOCAL INTESTINAL PARASITES: A ONE HEALTH APPROACH

conducted at the Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños, last July 3, 2024.

Given this 3rd day of July, in the Year Two Thousand and Twenty-Four, in the City of Los Baños, Laguna, Philippines.

VACHEL GAY PALLER, DSC
President, Philippine Society of Parasitology, Inc.

THE PHILIPPINE SOCIETY OF PARASITOLOGY, INC.

in partnership with University of the Philippines Los Baños

awards this

Certificate of Participation

to

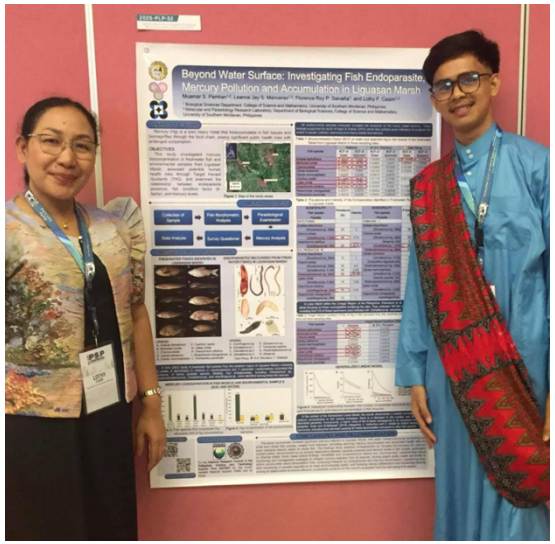
LOTHY F. CASIM

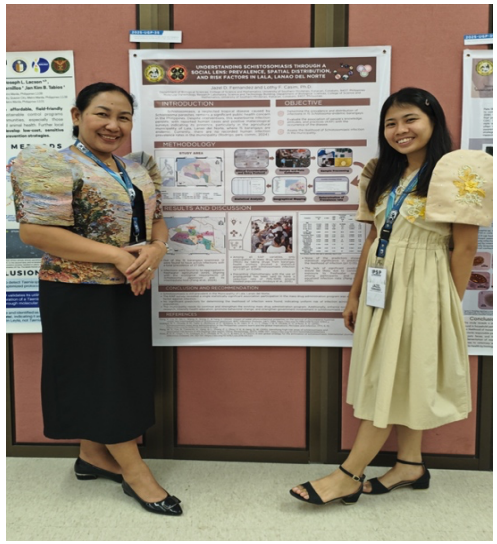
For actively participating at the 4th International Symposium and 94th General Assembly 2024 of the Philippine Society of Parasitology with a theme: "**One Health Parasitology, Bridging Towards Food Safety, Food Security, and Environmental Stewardship**" held on 4-5 July 2024 at the University of the Philippines, Los Baños, Laguna, Philippines".

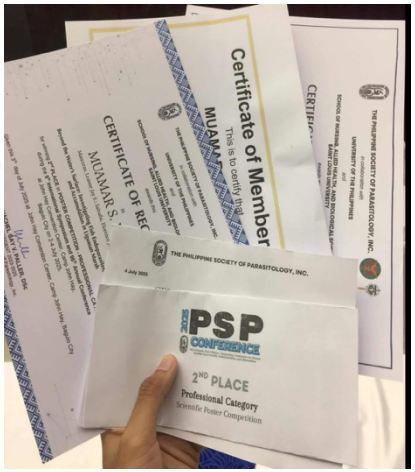
Given this 5th day of July 2024

Dr. Vachel Gay V. Paller
President 2023-2025
Philippine Society of Parasitology, Inc.

B. Mr Muamar S. Pamlian (Left photo) and Miss Jazel D. Fernandez (Right photo), with their thesis adviser – Dr Lothy F. Casim attended and presented their papers during the 5th International Conference of the Philippine Society of Parasitology held in Camp John Hay, Baguio city last July 1-4, 2025. Mr. Pamlian won **2nd Place in the Best Poster Competition (Professional Category).**







C. Mr. Muamar S. Pamlian (MS Biology student) and Dr Lothy F. Casim (MS-Biology faculty) attended in the 11th ASEAN Congress of Tropical Medicine and Parasitology (ACTMP) and 96th Annual PSP Conference last June 8-10, 2026 at Movenpick Hotel and Resort, Boracay.

THE 11TH ASIAN CONGRESS OF TROPICAL MEDICINE AND PARASITOLOGY
in conjunction with THE 96TH ANNUAL CONFERENCE OF PHILIPPINE SOCIETY OF PARASITOLOGY

One Health, One Asia: Strengthening Regional Collaboration in Science, Technology, and Innovation in Parasitology and Tropical Medicine

awards this

CERTIFICATE OF PARTICIPATION

to

Casim, Lothy F.

for their active participation during the *11th Asian Congress of Tropical Medicine and Parasitology*, held in conjunction with the *96th Annual Conference of the Philippine Society of Parasitology* at Mövenpick Resort & Spa Boracay, Malay, Aklan, Philippines from June 9 to 11, 2026.

Given this 11th day of June 2026 Mövenpick Resort & Spa Boracay, Malay, Aklan, Philippines.

VACHEL GAY V. PALLER, DSc
President
The Philippine Society of Parasitology, Inc.

SEC Registration No.: CN200810305

D. Professor Bryan Lloyd P. Bretana attended the Global Sustainable Development Congress at Istanbul Congress Centre, Turkey in June 16-19, 2025.

GLOBAL SUSTAINABLE DEVELOPMENT CONGRESS

Co-host

YÜKSEKÖĞRETİM KURULU
COUNCIL OF HIGHER EDUCATION

Convened by

THE Times Higher Education

This hereby certifies that

BRYAN LLOYD P. BRETAÑA

attended the
Global Sustainable Development Congress
on 16–19 June 2025
in Istanbul Congress Centre, Türkiye

Certified by:

Phil Baty
Chief Global Affairs Officer
Times Higher Education

E. Mr. Mark Jobert C. Ellaga (2MSBio student) and Dr Cherie C. Mangaoang participated in the International Symposium and 43rd Annual Meeting of the Association of Systematic Biologists of the Philippines on June 2-5, 2026.

Association of Systematic Biologists of the Philippines
(SEC Registration: CN201426825 – Association of Philippine Taxonomists Inc.)

awards this

Certificate of Participation

to

MARK JOBERT C. ELLAGA

for participating in the International Symposium & 43rd Annual Meeting of the Association of Systematic Biologists of the Philippines (32 hours), with the theme "*Maneuvering barriers and reinforcing synergies toward an inclusive and accessible systematics*", held via Zoom on 2–5 June 2026.

Given this 5th day of June 2026

ERIC ZEUS RIZO, PhD
ASBP President

CHRISTINE DAWN G. OBEMIO, PhD
MSU-GenSan Local Organizing Head

Association of Systematic Biologists of the Philippines
(SEC Registration: CN201426825 – Association of Philippine Taxonomists Inc.)

awards this

Certificate of Participation

to

CHERIE CANO-MANGAOANG

for participating in the International Symposium & 43rd Annual Meeting of the Association of Systematic Biologists of the Philippines (24 hours), with the theme "*Maneuvering barriers and reinforcing synergies toward an inclusive and accessible systematics*", held via Zoom on 2–5 June 2026.

Given this 5th day of June 2026

ERIC ZEUS RIZO, PhD
ASBP President

CHRISTINE DAWN G. OBEMIO, PhD
MSU-GenSan Local Organizing Head

F. Membership in International Organizations

BRITISH ECOLOGICAL SOCIETY

July 7, 2022

Certificate of Membership to the British Ecological Society Macroecology Species Interest Group

Dear Dr Tanalgo,

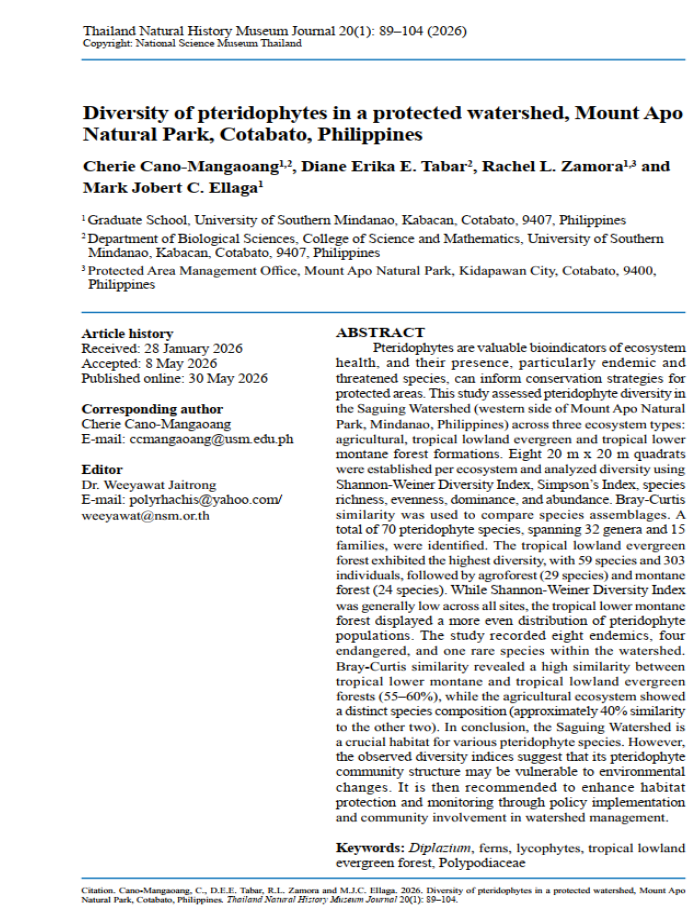
On behalf of the Macroecology Special Interest Group of the British Ecological Society, I would like to invite you as **Committee Member** of the BES Macroecology effective **July 8, 2022** to **July 8, 2023**.

The Macroecology Group provides a forum to unite researchers working at the macro-scale. The group are interested in the strengths and limitations of integrating concepts, questions and data across taxonomic, spatial and temporal scales, and the links among the disciplines of macroecology, macroevolution, palaeontology, conservation and others.

Your role will include facilitating the progress of the organisation, participate in the development of the organisation, the conferences hosted by the BES, and promote the organisation.

Natalie Cooper
Chair of BES Macroecology Special Interest Group

G. Publications of MS Biology Faculty with MS-Biology students in international Scopus/WOS Indexed Journals.



Thailand Natural History Museum Journal 20(1): 89–104 (2026)

Diversity of pteridophytes in a protected watershed, Mount Apo Natural Park, Cotabato, Philippines

Cherie Cano-Mangaoang[1,2], Diane Erika E. Tabar[2], Rachel L. Zamora[1,3] and Mark Jobert C. Ellaga[1]

[1] Graduate School, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines
[2] Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines
[3] Protected Area Management Office, Mount Apo Natural Park, Kidapawan City, Cotabato, 9400, Philippines

Article history
Received: 28 January 2026
Accepted: 8 May 2026
Published online: 30 May 2026

Corresponding author
Cherie Cano-Mangaoang
E-mail: ccmangaoang@usm.edu.ph

Editor
Dr. Weeyawat Jaitrong
E-mail: polyrhachis@yahoo.com/ weeyawat@nsm.or.th

ABSTRACT

Pteridophytes are valuable bioindicators of ecosystem health, and their presence, particularly endemic and threatened species, can inform conservation strategies for protected areas. This study assessed pteridophyte diversity in the Saguing Watershed (western side of Mount Apo Natural Park, Mindanao, Philippines) across three ecosystem types: agricultural, tropical lowland evergreen and tropical lower montane forest formations. Eight 20 m x 20 m quadrats were established per ecosystem and analyzed diversity using Shannon-Weiner Diversity Index, Simpson's Index, species richness, evenness, dominance, and abundance. Bray-Curtis similarity was used to compare species assemblages. A total of 70 pteridophyte species, spanning 32 genera and 15 families, were identified. The tropical lowland evergreen forest exhibited the highest diversity, with 59 species and 303 individuals, followed by agroforest (29 species) and montane forest (24 species). While Shannon-Weiner Diversity Index was generally low across all sites, the tropical lower montane forest displayed a more even distribution of pteridophyte populations. The study recorded eight endemics, four endangered, and one rare species within the watershed. Bray-Curtis similarity revealed a high similarity between tropical lower montane and tropical lowland evergreen forests (55–60%), while the agricultural ecosystem showed a distinct species composition (approximately 40% similarity to the other two). In conclusion, the Saguing Watershed is a crucial habitat for various pteridophyte species. However, the observed diversity indices suggest that its pteridophyte community structure may be vulnerable to environmental changes. It is then recommended to enhance habitat protection and monitoring through policy implementation and community involvement in watershed management.

Keywords: *Diplazium*, ferns, lycophytes, tropical lowland evergreen forest, Polypodiaceae

Citation. Cano-Mangaoang, C., D.E.E. Tabar, R.L. Zamora and M.J.C. Ellaga. 2026. Diversity of pteridophytes in a protected watershed, Mount Apo Natural Park, Cotabato, Philippines. *Thailand Natural History Museum Journal* 20(1): 89–104.

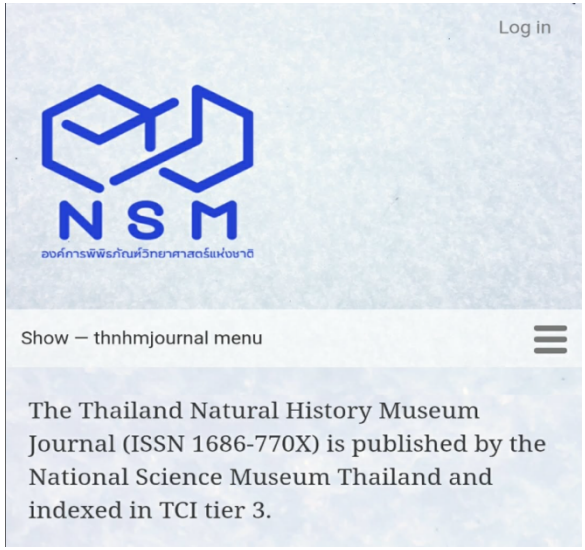
Diversity of pteridophytes in a protected watershed, Mount Apo Natural Park, Cotabato, Philippines

Issue

thnhmjournal vol20 no1

Authors

Cherie Cano-Mangaoang
Graduate School, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines / Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines
Diane Erika E. Tabar
Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines
Rachel L. Zamora
Graduate School, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines/Protected Area Management Office, Mount Apo Natural Park, Kidapawan City, Cotabato, 9400, Philippines
Mark Jobert C. Ellaga
Graduate School, University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines



The Thailand Natural History Museum Journal (ISSN 1686-770X) is published by the National Science Museum Thailand and indexed in TCI tier 3.

Current Research in Environmental & Applied Mycology (Journal of Fungal Biology)
16(1): 46–54 (2026) ISSN 2229-2225
www.creamjournal.org
Article
Doi 10.5943/cream/16/1/4

Diversity of myxomycetes and their occurrence on different substrata of three agroecosystems in Southern Mindanao, Philippines

Balabagan NA[1], Besana CM[2], Jumao-as CM[2], Salvaña FRP[1,2], and Cano-Mangaoang C[1,2]

[1] *Graduate School, University of Southern Mindanao, Kabacan, Cotabato, Philippines*
[2] *Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Kabacan, Cotabato, Philippines*

Balabagan NA, Besana CM, Jumao-as CM, Salvaña FRP, Cano-Mangaoang C 2026 – Diversity of myxomycetes and their occurrence on different substrata on three agroecosystems in Southern Mindanao, Philippines. Current Research in Environmental & Applied Mycology (Journal of Fungal Biology) 16(1), 46–54, Doi 10.5943/cream/16/1/4

Abstract

Monotypic vegetation types, such as agricultural plantations, provide various suitable substrates that are excellent for the isolation of myxomycetes. This study aimed to determine the diversity of myxomycetes across different agroecosystem microhabitats. Specifically, it aimed to identify myxomycetes up to the lowest possible level of classification, determine the diversity of myxomycetes, and determine the relationship between myxomycete occurrence on different substrata in different agroecosystems. The substrates collected from the five different agroecosystems included aerial litter, ground litter, twigs, and bark. The collected samples were incubated in a moist chamber to allow the development of plasmodia and fruiting bodies of the myxomycetes. All grown myxomycetes were described under the stereoscope for identification. A total of 24 myxomycete species were identified from the cacao, Lanzones, rubber, and rambutan agroecosystem sites at the University of Southern Mindanao Agricultural Research and Development Centre (USMARDC). Eleven of these species thrived in the rambutan plantation; however, the abundance of myxomycetes was documented in the durian plantation. Among the substrates used, bark yielded 48 individuals of *Arcyria cinerea*, accounting for most of the counts. Based on the logistic regression, the probability of a species' presence in an agroecosystem is nearly 14 times higher in durian than in rubber and 50% higher in bark than in other substrates. This study concluded that agroecosystems may sustain the establishment of myxomycetes in a variety of habitats and diversity in plantations of high-value crops.

Keywords – Diversity – fruiting bodies – myxomycetes – occurrence – species – spores

Introduction

The plasmodial slime molds (or myxomycetes) are phagotrophic eukaryotic organisms that exhibit characteristics of both protozoa and fungi (Dagamac & Dela Cruz 2015). Their life cycle is divided into two phases: a fungus-like phase that results in fruiting bodies bearing spores, and an animal-like phase that generates plasmodia from the fusion of myxamoeba and swarm cells (Keller & Snell 2002). The current classification for myxomycetes (slime molds).

Eumycetozoa in the supergroup Amoebozoa and Myxogastrids at higher levels (Adl et al. 2019). Myxomycetes are prevalent protist predators that consume bacteria and other

Submitted 04 October 2024, Accepted 25 March 2026, Published 21 April 2026
Corresponding Author: Balabagan Nof Abedin – e-mail – nabalabagan@usm.edu.ph

Philippine Journal of Science
151 (2): 643-654, April 2022
ISSN 0031 - 7683
Date Received: 28 Sep 2021

Bacterial Composition of *Scotophilus kuhlii* Guano from Plant Roost around Rice Farms in South-central Mindanao, Philippines

Cromwel M. Jumao-as*, John Aries G. Tabora, and Ma. Teodora N. Cabasan

Department of Biological Sciences, College of Science and Mathematics,
University of Southern Mindanao, Kabacan, North Cotabato 9407 Philippines

Conventional farming relies on the heavy application of synthetic agrochemicals, especially fertilizers. Thus, the search for an alternative sustainable source of safe agricultural inputs is imperative. Bat guano is an organic material that improves plant growth due to its rich chemical content and associated beneficial microorganisms. However, farmers still have a negative perception towards its utilization due to its associated microbiological hazards and limited supply. This study was conducted to determine the bacterial composition of guano produced by *Scotophilus kuhlii* to elucidate the potential benefits and hazards it poses when utilized as a soil amendment. The bacterial composition of a 24-h-old guano was investigated by sequencing the amplified 16S rRNA gene under Illumina MiSeq 250 PE system. A total of 78,670 valid DNA reads were obtained and clustered to 196 operational taxonomic units (OTUs). Eight bacterial phyla were identified dominated by Proteobacteria (40.52%), Bacteroidetes (21.43%), Actinobacteria (21.15%), and Firmicutes (16.58%). Under these phyla, 85 genera were identified dominated by *Acinetobacter* (32.16%), *Sphingobacterium* (12.94%), and *Glutamicibacter* (12.25%). Among all generated OTUs, 39 species were identified dominated by *Dietzia cinnamea* (19.91%), *Spingobacterium multivorum* (14.65%), *Acinetobacter variabilis* (14.57%), and *Enterococcus faecalis* (13.51%). The study revealed that guano of *S. kuhlii* harbors a diverse bacterial community, which could be a determinant of its usability as an organic soil amendment. Despite the presence of plant-growth promoters and biodegraders of hazardous environmental contaminants, the abundance of Proteobacteria indicates a high number of pathogenic species in the fresh guano. The results suggest the importance of crafting safety guidelines and protocols for guano processing that apply to small-scale farming to maximize the agricultural benefits of guano while reducing the risks imposed by its associated pathogenic bacteria.

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 November 2025 | 17(11): 27992–27996
ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)
https://doi.org/10.11609/jott.10017.17.11.27992-27996
#10017 | Received 25 June 2025 | Final received 30 October 2025 | Finally accepted 07 November 2025
SHORT COMMUNICATION
OPEN ACCESS

Abundance and distribution of the Critically Endangered Giant Staghorn Fern *Platycerium grande* (A.Cunn. ex Hook.) J.Sm. in Maguindanao del Sur, BARMM, Philippines

Marylene M. Demapitan [1], Roxane B. Sombero [2], Datu Muhaymin C. Abo [3], Nof A. Balabagan [4] & Cherie Cano-Mangaoang [5]

[1–5] University of Southern Mindanao, Kabacan, Cotabato, 9407, Philippines.
[3] Upi Agricultural School, Nuro, Upi, Maguindanao del Norte, Philippines.
[1] yna.demapitan@gmail.com (corresponding author), [2] roxanesombero26@gmail.com, [3] datumuhaymin97@gmail.com, [4] balabagannof@gmail.com, [5] ccmangaoang@usm.edu.ph

Abstract: *Platycerium grande*, commonly known as the Giant Staghorn Fern, is a notable species of the Pteridophyte family, Polypodiaceae – confined to the tropical forests of the Malay Archipelago, especially in Mindanao, part of the Philippines. This study assessed the abundance and distribution of *P. grande* in Maguindanao del Sur, as a baseline for future conservation efforts. Using purposive sampling, individuals were counted and georeferenced across multiple sites. A total of 186 individuals were recorded, predominantly thriving on large trees such as *Mangifera indica* (Mango), *Pterocarpus indicus* forma *indicus* (Narra), and *Samanea saman* (commonly called as Acacia in the Philippines), within an elevation range of approximately 672–754 m. A notable observation was the occurrence of the endangered fern, *Ophioderma pendulum*, attached to the basal fronds of *P. grande*. The findings provide valuable insights into the current status of this Critically Endangered fern in the Philippines and fill existing gaps in botanical knowledge of the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), and support future conservation plans and strategies in compliance with Republic Act No. 9147 (2001), the Wildlife Resources Conservation and Protection Act of the Philippines.

Keywords: BARMM, biodiversity, conservation, epiphytic fern, phorophyte, polypodiaceae, *Ophioderma pendulum*, staghorn fern.

Platycerium Desv., commonly known as staghorn ferns, is a genus of epiphytic ferns within the family Polypodiaceae. Members of this genus are commonly grown as ornamental plants and are of high value in horticulture due to their unique morphology (Hoshizaki & Moran 2001; Poremski & Biedinger 2001; Darnaedi & Praptosuwiryo 2003). It consists of about 18 species and is predominantly found in subtropical and tropical lowland forests of Africa, Madagascar, Australia, and Asia (Kreier & Schneider 2006). One notable species is the *Platycerium grande*, commonly known as the giant staghorn, which was once tagged as endemic to the Philippines, but is currently confined also to the Sulawesi in Indonesia and is occurring in the Malay Archipelago (Darnaedi & Clayton 2020; POWO 2025). This species can be distinguished from the other *Platycerium* species by its distinctive morphology, which consists of dimorphic fronds, with broad and shield-like sterile fronds, and antler-like fertile fronds which can grow to a considerable size while attaching to its phorophytes without harming or damaging them (Hoshizaki 1972; Hennipman & Roos 1982; Lee 1989; Hoshizaki & Price 1990; Hoshizaki & Moran 2001).

Although *P. grande* was recognized for its high economic value, this species is categorized in the DENR Administrative Order (DAO) No. 2017-11 as a

Editor: Anonymity requested. **Date of publication:** 26 November 2025 (online & print)

Citation: Demapitan, M.M., R.B. Sombero, D.M.C. Abo, N.A. Balabagan & C. Cano-Mangaoang (2025). Abundance and distribution of the Critically Endangered Giant Staghorn Fern *Platycerium grande* (A.Cunn. ex Hook.) J.Sm. in Maguindanao del Sur, BARMM, Philippines. *Journal of Threatened Taxa* 17(11): 27992–27996. https://doi.org/10.11609/jott.10017.17.11.27992-27996

Funding: Self-funded.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors are grateful to all who contributed to the fieldwork and documentation of samples, especially Ms. Shiela Gadia from the Ministry of Environment Natural Resources and Energy, South Upi, for the assistance rendered.

Veterinary Integrative Sciences 2024; 22(3): 895 - 905 DOI; 10.12982/VIS.2024.061

Vet Integr Sci

Veterinary Integrative Sciences

Faculty of Veterinary Medicine
Chiang Mai University

ISSN; 2629-9968 (online)

Website; www.vet.cmu.ac.th/cmvj

Research article

Zoonotic helminth infections in rodents and shrews from southern Philippines: Unforeseen One Health hazards

Mary Joyce H. Matullano[1], Jan Clyden B. Tenorio[2,*] and Lothy F. Casim[1]

[1]Molecular Parazitology Research Laboratory, Department of Biological Sciences, College of Science and Mathematics, University of Southern Mindanao, Kabacan 9407, Philippines

[2]Department of Veterinary Paraclinical Sciences, College of Veterinary Medicine, University of Southern Mindanao, Kabacan 9407, Philippines

Abstract

Rodents are known reservoirs of different zoonotic parasites. This study aimed to determine the occurrence of zoonotic helminths in rodents from different habitats in selected municipalities in Cotabato Province, Philippines. A total of 120 rodents and shrews were collected using live traps from two habitats (i.e., agricultural and residential areas) in the municipalities of Kabacan and Matalam. Formalin Ethyl Acetate Concentration Technique (FEACT) and microscpy revealed that 98/120 (81.67%) were infected with zoonotic helminths. Nine parasitic helminths were identified: six species were nematodes (Ascaris spp., *Gonglyonema* spp., *Nippostrongylus* spp., *Strongyloides* spp., *Angiostrongylus* spp. and *Capillaria* spp.); two species were trematodes (*Echinostoma* spp. and *Schistosoma japonicum*); and one cestode species (*Hymenolepis* spp). This is the first report of rodent gongyglonemiasis and schistosomiasis in the southern Philippines. Rats and shrews from agricultural areas had a higher diversity of infectious zoonotic helminths but infection rates were significantly higher in those captured from residential areas. This study confirmed that rats and shrews from the two municipalities are infected with varying zoonotic helminths which pose a significant but overlooked One Health threat to people, other animals, and their shared environment.

Keywords: Land Use, One Health, Public Health, Zoonoses

***Corresponding author**: Jan Clyden B. Tenorio, Department of Veterinary Paraclinical Sciences, College of Veterinary Medicine, University of Southern Mindanao, Kabacan 9407, Philippines. E-mail: jcbtenorio@usm.edu.ph.

Article history; *received manuscript: 9 October 2023,*
revised manuscript: 4 December 2023,
accepted manuscript: 4 January 2023,
published online: 19 January 2024
Academic editor: *Korakot Nganvongpanit*