Figure 1. The central administration building and convocation hall of Mawlamyine University.

WP.1.1: Information on existing curricula and human/technical resources of Mawlamyine University
incorporating **WP.1.3 Needs Assessment of Mawlamyine University**
providing baseline for **WP.2.7 Technical up-date of equipment to support curriculum delivery to Mawlamyine University**

BASED ON THE FOLLOWING WORKSHOPS:
9-10 July 2018: Mawlamyine University
and EQUIPMENT NEEDS **17-19 January, 2019: Myeik University**

1: Work packages 1.1 and 1.3 Results (narrative) (1000 characters)
In July 2019, a workshop took place in Mawlamyine University. As part of this workshop, information on existing curricula, human and technical resources (relating to environmental protection) of the Departments of Marine Science and Zoology of Mawlamyine University was compiled (WP.1.1). A needs assessment in environmental protection curriculum was initiated (WP1.3). The workshop was attended by Rectors and Pro Rectors of Mawlamyine and Myeik universities; 32 staff and students from Myeik and Mawlamyine universitie;s and 5 European staff. To support the monitoring and evaluation process of the project, information on the existing courses and syllabi will be used as a baseline to measure the project's progress in terms of developing a new curriculum in environmental protection. Further information was gathered at a subsequent meeting in January 2019. The latter will help support a technical up-date of equipment (WP.2.7), ensuring it is fit for purpose.

2: Anticipated outcome
- Compile information on existing curricula, human/technical resources at Mawlamyine University (WP.1.1) - *to provide baseline to measure milestones of the project and measure*

progress from the current curricula in the Departments of Marine Science and Zoology to the new curriculum

- Needs assessment in Environmental Protection curriculum (WP.1.3) – *survey of the needs/ gaps in order to implement a successful new curriculum in environmental protection*
- Baseline for the technical up-date of ICT infrastructure and equipment to support curriculum delivery (WP.2.7) – *to ensure that academic and ICT literacy platforms are available and fit for purpose.*

3: Responsible: Project coordinator, project manager, Myanmar universities contact persons.
The workshops were coordinated by the European trainers. Myanmar staff were responsible for gathering and presenting all relevant information. All who attended are listed in the attendance lists for each of the workshops. They include for the 9-10 July 2018 workshop:

- The Pro Rector of Myeik University, Prof Ni Ni Oo
- The Rector of Mawlamyine University (Prof Aung Myat Kyaw Sein) and Pro Rector Dr Mie Mie Sein
- The in-country project coordinator Dr Sai Sein Lin Oo (University of Mandalay)
- Four European staff from the University of Natural Resources and Life Sciences (Dr Swen Renner and Dr Paul Bates) and the University of Extremadura (Dr Martha Fallola and Dr Macarena Cuellar)
- Thirty-two staff and students from Myeik and Mawlamyine Universities.

A subsequent workshop at Myeik University from 17-19 January 2019 undertook a final assessment of equipment needs. It was led by Dr Swen Renner and Dr Marcela Suarez-Rubio from BOKU and attended by 28 Myanmar staff. The latter came from Myeik University (13 staff from the Departments of Botany, English, Geography, Geology, Marine Science, Physics and Zoology); Mawlamyine University (8 staff from the Departments of Marine Science and Zoology) and Mandalay University (7 staff from the Departments of Botany, Geology and Zoology).

Figure 2. Mawlamyine University staff attending the needs-assessment workshop, which took place on 9 and 10 July 2018.

4: Outcomes/outputs reached

- Baseline information on current curricula, courses and syllabi (MSc) in Marine Science and Zoology in Mawlamyine University relating to environmental protection (WP.1.1) (Appendix

1 and Item 8b on MuEuCAP website Downloads page https://www.myanmar-edu.org/downloads)

- Database of needs/gaps in teaching materials in Marine Science and Zoology in Mawlamyine University in environmental protection (WP.1.3)
- Baseline information to assist with the technical up-date of ICT infrastructure and equipment to support equipment delivery (WP.2.7).

5: Remarks – Mawlamyine University - Background Information

Rector: Prof. Dr (U) Aung Myat Kyaw Sein

Pro Rector: Prof. Dr (Daw) Mie Mie Sein

Mawlamyine University is the third largest university in Myanmar and the third oldest after Yangon and Mandalay. It is the second largest after Yangon in southern Myanmar. It greatly benefits from the drive and professionalism of its Rector and Pro-rector, who wish to see the university and its staff and students thrive in an international environment.

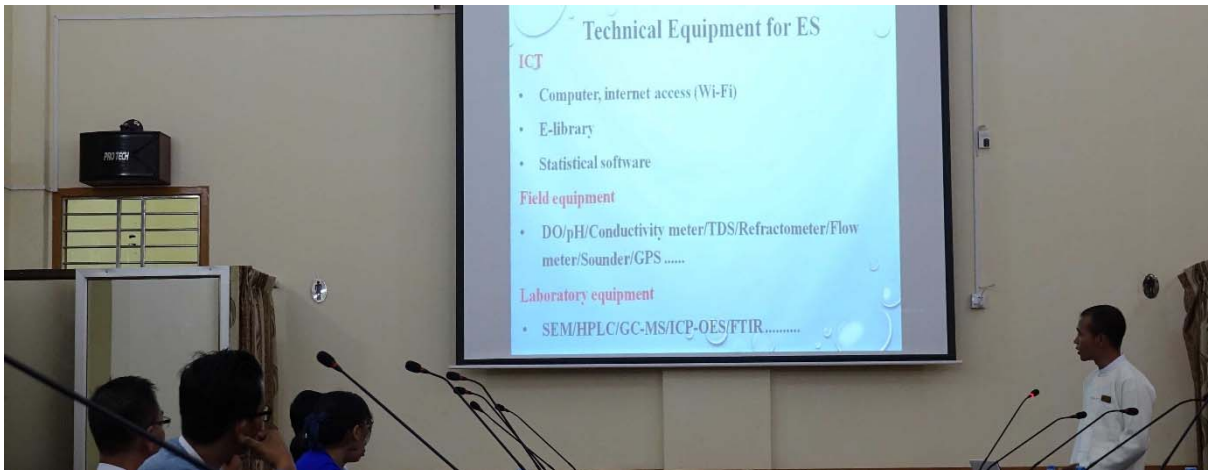
Mawlamyine University offers a curriculum in Botany, Zoology and Marine Science. The latter seems to cut across sectional topics and includes aspects of zoology and botany in coastal zones and the marine realm. Marine Science focuses on economically important species groups such as seagrass and fisheries, but also includes environmental science aspects in some courses. While true cooperation between the three departments in Mawlamyine University is not (yet) working, there is a slight overlap in interest, which has been identified together during the presentation of courses and syllabi.

Figure 3. Left: The Rector of Mawlamyine University addressing the MuEuCAP audience, with the Pro-rector of Mawlamyine on his right and the Acting Rector of Myeik University on his left. Right: the central meeting room of Mawlamyine University is well-equipped with audio-visual equipment, which facilitates round table discussions.

Faculty members interviewed (and/or holding a short presentation of their work) included Dr. Mie Mie Sein (currently Pro Rector), Dr. San Tha Tun (Head of Marine Science), Dr. Aye Aye Myint (Associate Professor Zoology Department), Ms Khin Myo Myo Tint Demonstrator Department of Marine Science), Dr. Hlaing Hlaing Htoon (Assistant Lecture Department of Marine Science), Dr. Naw Zarchi Ninn (Assistant Lecturer, Zoology Department), Aung Myo Hsan (Assistant lecturer), and May Thaw Khin and Aye Nyein Soe (both 1st year MSc students) at Mawlamyine University.

All staff state that they lack in specific hard skills such as: teaching adequate statistical skills; modern teaching skills beyond simple knowledge transfer from teacher to student; and how to teach students to develop a research question for their MSc theses. They also lack transversal skills, such as: the ability to adequately present teaching outcomes and how to present a teaching or research unit for example in pptx. In addition, they lack equipment, including standard equipment and specific equipment such as SEM, and equipment to test water chemistry and physical parameters for marine science. They are also critically short on text books and access to modern literature, with many of their reference books over 50 years old.

Mawlamyine University has already incorporated several environmental protection related courses into the curricula, such as environmental ethics, environmental law, ecology, conservation biology and quantitative ecology (which is a technical course in statistics in ecology). Particularly Marine Science offers courses with relevance for environmental protection in marine and costal ecosystems.



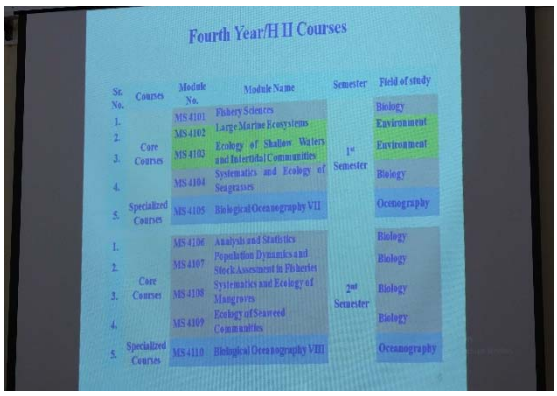


Figure 4. Various PowerPoint presentations at the July 2018 workshop in Mawlamyine University, which addressed the existing curricula in environmental protection (WP.1.1) and needs assessment (WP.1.3) of Mawlamyine University.

APPENDIX 1: Existing courses in Mawlamyine University relating to Environmental Protection

Marine Science Department

Figure 5. Prof San Tha Tun.

- Course No: MS 714
- Name of module: **Marine Resources**
- Teacher(s): San Tha Tun
- Type of course: PhD
- Level:
- ECTs: 4
- Curriculum: Marine Science
- Semester/Theory/Practical/Tutorial: 1,2 4 2 n/a
- Remarks:
- Learning Outcomes: To understand; The importance of Marine living resources and non-living resources; to know how to use marine resources wisely; to know how to manage marine resources sustainably.
- Course description: Fisheries resources: Scale of the world's fisheries, Fishing methods, overfishing, Fisheries regulation, Fish farming problems. Mineral resources: Terrigenous, Chemogenous, Biogenous deposits, Polymetallic nodules, Polymetallic crusts.

Figure 6. Hlaing Hlaing Htoon.

Course No: MS 1104

- Name of module: Biological Oceanograph y II
- Teacher(s): Hlaing Hlaing Htoon
- Type of course: BSc
- Level:
- ECTs: 4
- Curriculum: Marine Science
- Semester /Theory/Practical/Tutorial: 2 3 1 1
- Remarks:
- Learning Outcomes: To understand; Ocean terminology; Major taxonomic groups of marine organisms; Concept of food webs and ecological systems Life.
- Course description: Life history of plankton and benthos; Zonal distribution and migration; food webs and ecological systems; effect of abiotic factors on species and communities; chemical and physical effects of the community on their environment; pollution; exploitation.

Course No: MS 2107
Name of module: **Physical Oceanography**
Teacher(s): Khin Myo Myo Tint
Type of course:
Level: BSc
ECTs: 4
Curriculum: Oceanography
Semester/Theory/Practical/Tutorial: 2 0 1 0
Remarks:
Learning Outcomes: Have knowledge of general physical properties of ocean.

Course description: The nature of seawater; Physical properties of ocean water; climate patterns, weather, formation and impacts of El Niño/La Niña on marine environments; renewable sources of energy; ocean circulation; wave characteristics.

Course No: MS 2110
Name of module: **Marine Vertebrates**
Teacher(s): Khin Myo Myo Tint
Type of course:
Level: BSc
ECTs: 3
Curriculum: Marine Science
Semester/Theory/Practical/Tutorial: 2 0 1 0
Remarks:
Learning Outcomes: Knowing about the general characteristics of Chordate.
Course description: Classification of Chordate; External features of bony fishes; The general characters of Amphibians; The general characters of Reptiles; The general characters of Aves; The general characters of Mammalia.

Course No: MS 4104
Name of module: **Systematics and Ecology of Seagrasses**
Teacher(s): Aung Myo Hsan
Type of course: BSc
Level:
ECTs: 4
Curriculum: Marine Science
Semester/Theory/Practical/Tutorial:
Remarks:

Figure 7. Aung Myo Hsan.

Learning Outcomes: Basic principles of ecology; The important roles and of seagrasses; Conservation and monitoring program.
Course description: Systematics; Ecological roles; Adaptation to their environment; Productivity; Sampling; Long term monitoring programme.

Course No: MS 5208
Name of module: **The Health of the Oceans**
Teacher(s): Aung Myo Hsan
Type of course:
Level: BSc
ECTs: 4
Curriculum: Environmental Science
Semester/Theory/Practical/Tutorial: 2 3 2 n/a
Remarks:

Figure 8. Aung Myo Hsan.

Learning Outcomes: Biological and chemical constituents and their pattern of recycle; Knowing specific problems concerned with environment; Values of environment; Methods for the assessment and controlling procedures.
Course description: Oceans system; Biogeochemical cycles; Pollution in the marine environment; Uses of the marine environment in relation to pollution; Specific problems of regional significance; Methodology for the assessment and control of marine pollution.

Course No: MS 613
Name of module: **Biology of Large Marine Mammals**
Teacher(s): May Thaw Khin
Type of course:
Level: MSc
ECTs: n/a
Curriculum: Marine Science
Semester/Theory/Practical/Tutorial: 1 n/a n/a n/a
Remarks:
Learning Outcomes: to know the different kinds of marine mammals; to know the conservation needs for marine mammal.
Course description: Basic knowledge of large marine mammals; Adaptation of swimming and diving mechanism; Behaviour of large marine mammals (Seals, Sea lions, Dugong, Dolphin, Porpoises and Whales); Mechanisms of echolocation; Vocalization and complex behaviour of Cetaceans; Feeding mechanisms; Reproductive behaviour of whales in their natural environment.

Course No: MS 624
Name of module: **Estuarine Ecology**
Teacher(s): May Thaw Khin
Type of course:
Level: MSc
ECTs: n/a
Curriculum: Marine Science
Semester/Theory/Practical/Tutorial: 2 n/a n/a n/a
Remarks:
Learning Outcomes: To know estuary is important habitat for euryhaline species; To know how to manage impacts on estuarine communities.
Course description: The nature, origin and classification of estuaries; Physical characteristics of estuary; Human impacts on estuarine communities.

Zoology

Course No: Zool 1102
Name of module: **Life Processes and Homeostasis**
Teacher(s): Aye Aye Myint
Type of course:
Level: BSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 3 2 n/a
Remarks:
Learning Outcomes: Receive the basic concept on metabolic reaction take part in various organisms.
Course description: Nutrition; Cellular respiration; Transport, Types of circulatory system; Homeostasis; Adaptations for hot and cold environments.

Figure 9. Dr Aye Aye Myint.

Figure 10. Dr Aye Aye Myint.

Course No: Zool 3115 /3215
Name of module: **Toxicology**
Teacher(s): Aye Aye Myint
Type of course:
Level: BSc, BSc(Hons)
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 3 2 n/a
Remarks:
Learning Outcomes: Obtain knowledge of sources, levels and mechanisms of action for toxic substance; knowledge of effects of toxic substances on cellular levels, individuals health and on natural populations and communities. Myanmar.
Course description: Definition on toxicology; Basic knowledge of toxicology; Research methodology in toxicology; Acute toxicity, Chronic toxicity, Potential sources of toxicities, Poison prevention and control strategies; Environmental pollution and health effects; Health impact of specific pollutants; Diseases caused by hazardous pesticides; Pesticide toxicity research in

Figure 11. Dr Aye Aye Myint.

Course No: Zool 622(a)
Name of module: **Environmental Studies and Conservation Management**
Teacher(s): Aye Aye Myint
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:
Learning Outcomes: Get knowledge to solve problem related to wildlife conservation and management; and also have a greater knowledge of how wildlife conservation and management relates to the economy and environment, both currently and in the future students will be able to critically evaluate current events and public information related to wildlife conservation and management.
Course description: Environmental Ethics; A view on Earth; Protecting resources; Sustainable water management; Earth's Resources and Man; Natural cycles between the spheres; Renewable resources; Global warming; Measuring exposure to environmental hazards; Ecosystems; Value of biodiversity; Conservation Strategies; Value of endangered species; Kinds of managements; Conservation in practice management plan.

Figure 12. Dr Aye Aye Myint.

Course No: Zool 5209
Name of module: **Evolution**
Teacher(s): Aye Aye Myint
Type of course:
Level: BSc BSc(Hons)
ECTs: 4
Curriculum: Zool
Semester/Theory/Practical/Tutorial: 2 3 2 n/a
Remarks:

Learning Outcomes: Students will be able to understand the relation of chemical evolution and biological evolution, phylogeny and speciation; in addition to obtain the interaction between humans and other animals.
Course description: Evidence of evolution; Natural selection; The essence of Darwin Theory; Types of selective process; Allele frequencies change; Origin of species; Reproductive isolation; Chromosome change; Fossil record; Rate of evolution.

Course No: Zool 1001
Name of module: **Chemicals of Life and Life Processes**
Teacher(s): Naw Zarchi Linn
Type of course:
Level: BSc
ECTs: 4
Curriculum:
Semester/Theory/Practical/Tutorial: 2 2 2 n/a
Remarks:

Figure 13. Dr Naw Zarch Linn.

Learning Outcomes: Understanding the chemical basis of living cells and tissues; Awareness of the importance of the chemical elements in nutrition and health.
Course description: Variations in vertebrate digestive systems; Accessory organs: secretions of the pancreas; the liver and gallbladder; The actions of insulin and glucagon; Regulatory functions of the liver; Regulatory of blood concentration; Neural and hormonal regulation of digestion; Food energy and energy expenditure; Essential nutrients.

Course No: Zool 621
Name of module: **Physiology and Endocrinology**
Teacher(s): Eaindar Cho
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial:
Remarks: Gain broad knowledge of animal physiology and endocrinology; understand physiological mechanisms and know fundamental scientific concepts; get an understanding of how the parts of body are linked into a whole function.
Learning Outcomes: Cellular physiology and homeostasis; physiology of digestion; chemical coordination endocrine system.

Course No: Zool 622(b)
Name of module: **Environmental studies and conservation management**
Teacher(s): ?
Type of course:
Level: MSc
ECTs: 4
Curriculum: Environmental Science
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:
Learning Outcomes: Know how our environment is important; understanding about wildlife conservation and management and how to solve its problems; about what and how can we do in our

daily life to protect our environment; get greater knowledge of the relationship between wildlife conservation management and the economy and environment in the present and future.
Course description: Environmental studied; Environmental ethics; A view of Earth; Protecting resources; Sustainable water management; Earth resources and man; Climate change; Environmental hazards and ecosystems; Value of biodiversity; Conservation strategies; Value of endangered species; Kinds of management; Conservation in practice management plan.

Course No: Zool 623
Name of module: **Evolutionary biology and animal behavior**
Teacher(s): Eaindar Cho
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial:
Remarks:
Learning Outcomes: Understand the relation of chemical evolution and biological evolution; Understand the phylogeny and speciation; Gain an understanding the interaction between humans and other animals.
Course description: Evidence of evolution; Populations can become isolated in several ways; Patterns in evolution; Genetic drift; Natural selection; Science and the study of behaviour; Habitat selection and use; Foraging and antipredator behaviour.

Course No: Zool 624
Name of module: **Invertebrate Immunology**
Teacher(s): ?
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:
Learning Outcomes: The students should be more interested in morphology of microbe; The students should be more understand about immune response of microbe.
Course description: The immune defences of invertebrates; Mechanisms of immune modulation; Evasion of the innate immune system by virus; Neuroendocrine control of the immune response; Immunomodulation by parasitic helminths and its therapeutic exploitation.

Course No: Zool 621
Name of module: **Physiology and Endocrinology**
Teacher(s): Aye Nyein Soe
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:

Learning Outcomes: Students will be able to an integrated understanding of physiological mechanisms; Students will have an appreciation of how the parts of body are linked into a whole function.
Course description: Cellular physiology and homeostasis; Definitions and features; Osmosis, metabolism,; Types of digestion; The birth of endocrinology; Nuclear receptors; Hormones of metabolism.

Course No: Zool 622
Name of module: **Environmental studies and conservation management**
Teacher(s): Aye Nyein Soe
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:
Learning Outcomes: Students will be able to apply knowledge to solve problems related to wildlife conservation and management; Students will have greater knowledge of how wildlife conservation and management relates to the economy and environment, both currently and in the future; Students will be able to critically evaluate current events and public information related to wildlife conservation and management as being scientifically bases and contributes to the knowledge base of information.
Course description: Environmental studies; A view of Earth; Groundwater; Water pollution; Volcanoes; Various spheres; Air pollution; Climate changes; Global warming and acid rain; Biodiversity; Wildlife conservation and management.

Course No: Zool 623
Name of module: **Evolutionary biology and animal behaviour**
Teacher(s): ?
Type of course:
Level: MSc
ECTs: 4
Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:
Learning Outcomes: Understand the relation of chemical evolution and biological evolution; Understand the phylogeny and speciation; Gain an understanding the interaction between humans and other animals.
Course description: Evidence of evolution; Populations can become isolated in several ways; Patterns in evolution; Genetic drift; Natural selection; Science and the study of behaviour; Habitat selection and use; Foraging and antipredator behaviour.

Course No: Zool 624
Name of module: **Invertebrate Immunology**
Teacher(s): ?
Type of course:
Level: MSc
ECTs: 4

Curriculum: Zoology
Semester/Theory/Practical/Tutorial: 2 4 2 n/a
Remarks:
Learning Outcomes: The students should be more interested in morphology of microbe; The students should be more understand about immune response of microbe.
Course description: The immune defences of invertebrates; Mechanisms of immune modulation; Evasion of the innate immune system by virus; Neuroendocrine control of the immune response; Immunomodulation by parasitic helminths and its therapeutic exploitation.

APPENDIX 2: WP1.3 Needs Assessment of <u>Mawlamyine University</u>

Mawlamyine University has similar needs to those of the Universities of Mandalay and Myeik.

Curriculum: As with the Universities of Mandalay and Myeik, in general, elements of courses within the existing curricula can be adapted and enhanced to provide a good delivery of an Environmental Protection curriculum. Only a small number of new courses are required. As WP2 is developed, it will become apparent that some will be developed by splitting topics from existing courses.

Figure 3. Much training in scientific field methods is required, as here with Mawlamyine University staff and students receiving training from staff of the University of Extremadura, Spain.

Staff needs: Almost all staff of Mawlamyine University require skills upgrading before they can supervise an MSc in Environmental Protection to an international standard. As with Mandalay and Myeik Universities, technical/scientific skills are most needed in the following aspects:

- Developing a research question and literature research
- Developing a testable hypothesis
- Selecting measurable indicators
- Planning of analysis and statistics
- Design of empirical study
- Preproposal and presentation
- Sampling/fieldwork
- Statistical analysis
- Writing report/paper.

These skills will be enhanced in WPs2 and 3. At the same time, the project will seek to upgrade the soft/transferable skills of Myeik University staff.

Technical needs: As with Myeik and Mandalay Universities, most technical equipment in Mawlamyine University is of limited quality and quantity. There are some simple microscopes and

simple equipment but much/most equipment which is associated with best practice in teaching science is absent.

ICT needs: As with Myeik and Mandalay, most staff and many students have their own laptops. Some seminar rooms are extremely well equipped with LCD projectors and microphones. IT communication (LAN network access and infrastructure is absent, own servers are absent, access to "EduRoam" or other internationally standards are not yet available.

Library resources: Library resources are challenging. Many of the books are out-of-date and in general there is little or no access to the web of science or any other web-based resources, such as online libraries. Access to scientific journals, which are not open access, is only through international co-operation.

Language skills: As elsewhere in Myanmar's universities, the majority of staff and students at Mawlamyine University have restricted English skills. Most can understand English, if spoken slowly; some are shy to speak English and many/most struggle to write scientific English. A minority speak English fluently and have excellent comprehension; a small minority are unable to speak English to any extent.

Gender, ethnic background: The vast majority of staff in Mawlamyine University in the subject areas with which MuEuCAP is involved (Departments of Botany, English, Marine Science, Zoology), including senior staff are female. The Rector is male but the Pro-rector is female as too are the majority of students - undergraduate and especially postgraduate. Ethnicity is a difficult subject in Myanmar but Mawlamyine University staff and students within the MuEuCAP group are mainly drawn from the Mawlamyine geographical area.