



MaRHE CENTER
Marine Research and High Education Center

CORAL HEALTH AND DISEASE ASSESSMENT WORKSHOP

30 November – 7 December

2021



Led by Greta Aeby, Michelle M. Dennis, Simone Montano

INTRODUCTION

WHY THIS WORKSHOP?

Coral reefs are one of the most biodiverse, complex and productive ecosystems on earth, supporting nearly a quarter of all marine life. They also directly support hundreds of millions of people worldwide by providing coastal protection, valuable sources of dietary protein and income from fisheries and tourism. Sadly, they are also one of the world's most endangered ecosystems and among the most heavily degraded. They are a very fragile environment that over the last several decades has experienced increasingly stressful conditions due to a combination of natural and anthropogenic factors.

Coral diseases represent one of the most serious threats to reef ecosystems. The disease outbreak currently impacting Florida's Reef Tract exemplifies how devastating disease can be for corals. The disease outbreak has fundamentally shifted the coral community structure of Florida's coral reefs, and has resulted in regional declines of almost 100% for some critical reef building coral species. The Caribbean has long been considered a coral disease "hotspot" but disease has now emerged as a problem for coral reefs throughout the Indo-Pacific region. Despite the increasing number of studies reporting on diseases affecting corals and other marine taxa worldwide, the effort to investigate Indo-Pacific coral diseases has been, until now, disproportionately low, especially considering that the Indo-Pacific hosts 91% of the world's coral reefs. Lack of disease studies is especially concerning in areas such as the Republic of Maldives that consists entirely of coral reefs. Maldivian coral reefs are significant on a global scale as well, being the 7th largest in terms of area covered, contributing up to 5% of the world's reef area. Numerous regions around the world lack basic information on the health of their coral reef ecosystems hampering the capacity for managers to effectively tackle threats. This workshop was designed to address this need by training interested students, managers, and biologists in identification, understanding and management of coral diseases.

The **1st Edition** of the **Coral Health and Disease Assessment Workshop** is your opportunity to gain hands-on experience in this active strategy for coral reef conservation.

ABOUT THE CORAL HEALTH AND DISEASE ASSESSMENT WORKSHOP

This is an intensive 8-day hands-on, in-water practical program. The training will focus on coral reef health assessment in the field with activities aimed to help students understand the importance of health monitoring in coral reef ecosystems, threats to coral reefs, field and laboratory methods used to assess coral reef health, their advantages and limitations, and management practices that can help reefs become more resilient.

The workshop will be divided into a series of classroom lessons and field activities. It will be coordinated by

Dr. Greta Aeby of Qatar University, who, for the past two decades, has been researching the ecology of coral diseases in Hawaii and the Pacific Islands. She is currently working on coral health in the Middle East and is a consultant on the disease outbreak in Florida.

Dr. Michelle M Dennis is an Associate Professor of anatomic pathology at the University of Tennessee College of Veterinary Medicine, and has over 15 years' experience in diagnosis and research of aquatic animal diseases, including marine mammals, sea turtles, finfish, gastropods, crustaceans, bivalves, and corals.

Dr. Simone Montano of the University of Milano-Bicocca, who has worked on the ecology and biodiversity of Maldivian coral reefs.

The program will be held at the **Marine Research and High Education Center (MaRHE Center)** of Milano-Bicocca University in Magoodhoo Island, Faafu Atoll, about three hours by speedboat from Malé airport. All field activities will be carried out using SCUBA diving and snorkeling.

CORAL HEALTH AND DISEASE ASSESSMENT WORKSHOP

The course will consist of a series of lectures and field activities held by international researchers with experience in monitoring and researching coral reef health in tropical marine environments. Classes will be held at the advanced training center. Part of the field activities in the sea will require scuba diving.

After completion of this training, you will be able to:

- Improve your knowledge on coral biology and ecology
- Have an appreciation for the disease investigation concept and tools to investigate wildlife diseases
- Have an appreciation for general health of reef organisms (turtles, fish, echinoderms, corals)
- Identify corals found in the Maldives to genus level
- Understand the status of coral reefs and the threats from disease
- Improve your knowledge in the proper description of lesions in corals
- Implement a survey and investigative techniques to assess coral health
- Improve your in-situ identification and description of coral lesions
- Improve your knowledge of sample collection and processing techniques for histopathological and microbial studies
- Assess the need for coral histopathology during disease studies
- Improve the interpretation of coral histology slides

At the end of the **Coral Health and Disease Assessment Workshop** the University of Milano-Bicocca will release a digital certificate – Open Badge – to recognize the participant's skills and achievements in the field of coral diseases (Coral Health and Disease Assessment Workshop).

For more details, please visit: www.openbadges.org and <https://bestr.it/badge/show/1866>

WORKSHOPS DAILY PROGRAM

Day 1 – arrival, briefing on next day's activities

Day 2 –

- Lecture 1: [Review of coral biology and ecology](#)
- Lecture 2: [Identification of coral genera](#)
- Open water session 1: Diving skills check and practice coral genera identification
- Lecture 3: [Coral reefs, coral disease and the need for management](#)
- Lecture 4: The importance of health monitoring in coral reef ecosystems
- Recap of session and briefing on next day's activities

Day 3 –

- Lecture 5: [Principles of wildlife disease investigations](#)
- Lecture 6: [The need for histology in disease studies](#)
- Lecture 7: [Identification of coral disease and description of lesions](#)
- Open water session 2: review coral genera identification and practice lesion identification (snorkel)
- Lecture 8: [Ecology of common coral diseases](#)
- Lecture 9: [Steps in coral disease research](#)
- Recap of session and briefing on next day's activities

Day 4 –

- Lecture 10: [Coral disease drivers and management actions](#)
- Lecture 11: [Ecological investigation of coral disease](#)
- Lecture 12: [Overview of field protocols for baseline surveys and outbreaks, sample collection and processing protocols for histology and microbiology](#)
- Open water session 3: Conduct field surveys: colony counts, line-intercept, disease assessment
- Data entry and analysis
- Recap of session and briefing on next day's activities

Day 5 –

- Lecture 13: [Normal coral anatomy and description of lesions](#)
- Hands-on training 1: Slide reading practice-normal polyp anatomy
- Hands-on training 2: Slide reading practice-lesions with discoloration
- Open water session 4: sample collection for histology and microbiology (snorkel)
- Hands-on training 3: sample processing, microscopic analysis of fresh coral lesions
- Recap of session and briefing on next day's activities

Day 6-

- Lecture 14: [Review normal coral anatomy and description of lesions](#)
- Hands-on training 4: Slide reading practice-growth anomalies
- Open water session 5: Conduct field surveys: colony counts, line-intercept, disease assessment
- Data entry & analysis
- Recap of session and briefing on next day's activities

Day 7 –

- Open water session 6: Conduct field surveys: colony counts, line-intercept, disease assessment
- Data entry & analysis
- Lecture 15: [Review normal coral anatomy and description of lesions](#)
- Hands-on training 5: Slide reading practice- tissue loss lesions
- Sharing of survey results and briefing on departure procedures

Day 8 - Departure from Magoodhoo to Malè airport

IMPORTANT: The program may be subject to small changes, due to weather and sea conditions or other problems

DIVING REQUIREMENTS

- Each participant must have a diving license with a minimum of 20 logged dive or a minimum of 15 logged dive with at least 5 dives performed in the last 6 months before the Workshop.
- All divers must have a valid Diving Insurance (DAN or similar) in order to perform diving activities.
- Every diver has to fill in upon his/her arrival at MaRHE Center a medical declaration (**see Appendix 1 as example**). In case of positive answer to any questions, an additional medical certificate will be required to attest the suitability to diving activities

USEFUL INFORMATIONS

DOCUMENTS

To go to Maldives it is necessary to have a **valid passport** (validity at least six months after the exit from the country) **with at least 2 empty pages**

CLOTHING AND EQUIPMENT

The air temperature is around 28-29°C. The weather is always pleasant, even during the rainy months (Fig 1). Please note that most of the day will be occupied by field activities, seminars and exercises, it is therefore advisable to wear comfortable and sport clothes.

Please avoid skimpy clothing, as Magoodhoo island is not a tourist destination and local costumes are those of an Islamic country.

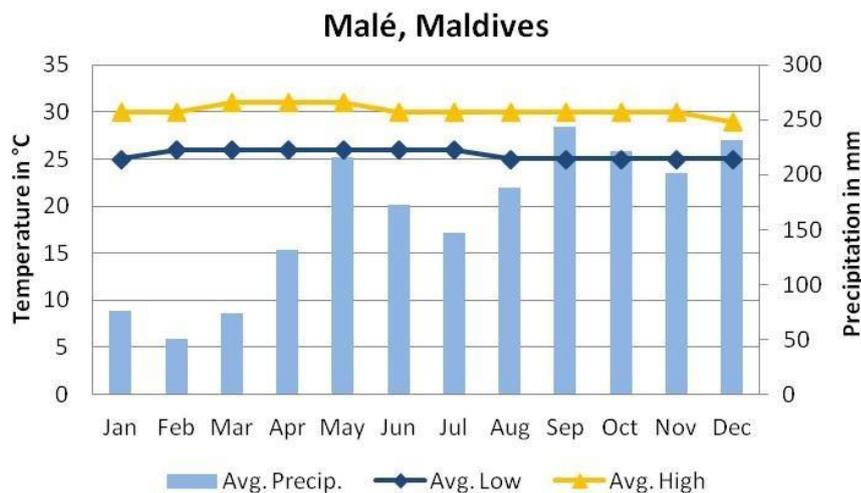


Fig 1. Monthly air temperature (°C) recorded in Maldives and monthly averages of sunny and rainy hours recorded in Maldives

For field activities it is necessary to have - in addition to a bathing suit and a towel - **the following equipment:**

- mask;
- snorkel;
- fins (booties);
- wetsuit;
- diving computer;
- please bring an underwater camera if you have one

It is possible to rent diving equipment on site, depending on size and availability.

ACCOMMODATION AND MEALS

The accommodation has been organized at the guesthouse of the Centre, in multiple-occupancy rooms with bathroom, full board (breakfast, lunch and dinner). Sheets and towels are provided. The food is prepared according to the local customs and consists, for the most part, of fish, chicken, rice and vegetables prepared in different ways.

EXCHANGE

The Maldivian currency is the Maldivian Rufiyaa (MVR). Euro and dollars are accepted in any bank and exchange office.

1 Euro = about 18 Rufiyaa ; 1 US \$ = about 15 rufyiaa;

SAFETY

Any field activity presents risks and dangers, and there are some basic rules to be observed in order to minimize these risks.

In the water it is necessary to respect the buddy system: working groups will be settled, and, within the group, working couples will be established

HEALTH

Important: please read carefully the COVID-10 Health and Safety Protocol below

Only COVID-19 vaccination is required to enter the Maldives from Europe and this should be taken before travelling to the Maldives. However, each participant should take care of this aspect in order to enter the country.

COVID-19 Health and Safety Protocol

Mandatory requirements to access MarHE Center

- Be fully vaccinated against COVID-19 (prove it with a vaccination certificate written in English) or be in possession of the European COVID-19 Green Certificate
- Present a negative result for a nucleic acid test (PCR test) for Covid-19 of less than 48 hours prior to landing in the Maldives
- Possess health insurance with appropriate coverage for COVID-19

Safety measures at MarHE Center

- Daily temperature screening is carried out at the Center
- It is mandatory to wear face masks correctly **at all times**, except while having meals or during diving trips. While still on the boat, however, the mask should be kept on.
- Each visiting group is organized with **4-person “bubbles”**. Each bubble shares the same room, the same dining table, and the same desk row in the classroom. It is mandatory to always sit at the same dining table and classroom seat.
- The field activities are carried out in groups of 4 (same “bubble”) + 1 researcher leading the activity.
- Hand hygiene: hand washing should occur after touching anything, after using the restroom, prior to eating, and after touching one’s face or blowing one’s nose.
- Social distancing: always stay at least 2 meters from other individuals (except people of one’s own bubble), do not gather in groups, and stay out of crowded spaces.

Testing and positive cases

Individuals with concerning symptoms will be tested by the local doctor for COVID-19.

Individuals who test positive for COVID-19 will have to abide by the Maldivian HPA protocol, which is constantly evolving. If the HPA guidelines allow it, the person will be temporarily relocated to a separate designated room for the 10-day isolation period.

After this period, the person will be tested again to ascertain whether or not the isolation period can come to an end. If the test result remains positive, the person is required to undergo another 10-day isolation period.

When the individual who has tested positive is isolated, the 3 individuals belonging to the same “bubble” will also be isolated in 3 separate rooms for 10 days, and if no symptoms arise in that period they can leave.

A MaRHE Center staff member will remain on the island as long as anyone is subject to quarantine.

All medical and logistical costs incurred by the person who tested positive for COVID-19 are his/her responsibility.

Please note that Covid-19 rules could change through time due to the global health situation, which is constantly evolving.

For any doubts, questions or requests regarding the situation, do not hesitate to contact us at: marhe@unimib.it

COST AND REGISTRATION

The cost of the CORAL HEALTH AND DISEASE ASSESSMENT WORKSHOP is

- **1350** Euro student (regularly registered at any university course)
- **1450** Euro for non-student

The above amount **includes**:

- boat transfer from/to Malé airport;
- transfers for all the activities envisaged under the internship program;
- room and board at the MaRHE Center of Magoodhoo: full board treatment and accommodation in multiple rooms (single rooms are not available);
- lessons and activities provided for the internship program.

The above amount **does NOT include**:

- flight to/from Malé;
- passport renewal expenses;
- entry visa (if required) to the Maldives
- anything else not specified above

REGISTRATION:

To proceed with the registration, you have two options:

Option 1) you can complete the questionnaire which you can find at the following link:

<https://forms.gle/4yXnHHrnsKxJ4tb5A>

After completing the questionnaire that you will find at the link, we ask you to send an email to the address marhe@unimib.it specifying in the subject: "**Name Surname – Registration Coral Health and Disease Assessment Workshop**".

Option 2) you can confirm your registration by e-mail sending the registration form duly filled (found below) to marhe@unimib.it and simone.montano@unimib.it

For both options we kindly ask you to send us a good quality scan of your passport and your CV

IMPORTANT: You need to wait for our confirmation before proceeding with the payment of the installment and purchase your flight.

The workshop will be activated once a minimum number of participants has been reached, at which time we will give you the green light to purchase your flights. Your mistakes (incorrect flight dates or other) cannot be reimbursed. A maximum number of participants is also provided (16). **The deadline for registration is set for 1st October 2021.**

FLIGHT TICKET:

You will be responsible for purchasing the flight. The choice of airlines is at your discretion, however, it is important that you arrive at Malè airport at the day and time established after registration.

Furthermore, it is necessary to send us a copy of the air ticket by **15 October 2021** so that we can procure the appropriate entry visa for you.

Bank Account details:

IBAN: IT87 K056 9601 6280 0000 0200 X71

Headed to:

UNIVERSITA' DI MILANO-BICOCCA

BANCA POPOLARE DI SONDRIO

AGENZIA DI MILANO AG. n. 29 – BICOCCA, Piazza della Trivulziana, 6

20126 - MILANO

SWIFT CODE: POSOIT22XXX

Purpose of payment:

“Coral Health and Disease Assessment Workshop – 1st Edition” + [NAME and SURNAME].

For more information please contact – Simone Montano (simone.montano@unimib.it) or MaRHE Center (marhe@unimib.it)

WE ALSO REMIND YOU THAT:

PLEASE PROCEED WITH PURCHASE OF THE FLIGHTS ONCE THE DATES ARE CONFIRMED.

THIS IS A WORKSHOP THAT REQUIRES A SCUBA DIVING CERTIFICATE FOR ENROLLMENT.

Training credits will be recognized for students enrolled in the International Marine Sciences master's course (University of Milan-Bicocca). In particular, for such students the set of all the activities carried out during the workshop will grant a total of **4 CFU** (practical training).

Students enrolled in other degree courses and / or other universities are requested to inquire with their didactic secretariat.

REGISTRATION FORM

CORAL HEALTH AND DISEASE ASSESSMENT WORKSHOP

UNIVERSITY OF MILANO-BICOCCA & CORALS DE PAZ

FULL NAME (as reported on the passport)

PLACE AND DATE OF BIRTH

ATTENDING THE _____ YEAR IN _____ (degree course attending)

REGISTRATION NUMBER _____

e-Mail: _____

Tel.: _____

ALLERGY OR FOOD INTOLERANCE No Yes (if so please specify)

ALLERGY DRUG No Yes (if yes please specify)

CHRONIC DISEASE No Yes (if yes please specify)

DO YOU HAVE A SCUBA DIVING CERTIFICATE? No Yes

WHAT IS YOUR HIGHEST SCUBA DIVING CERTIFICATION LEVEL?

HOW MANY LOGGED DIVES DO YOU HAVE? _____

WHEN DID YOU DIVE THE LAST TIME? _____

(You are required to submit copy of your SCUBA diving certificate with this registration form.)

PARTICIPANT'S SIGNATURE

Appendix 1

MEDICAL STATEMENT

The purpose of this Medical Questionnaire is to find out if you should be examined by your doctor before participating in recreational diving. A positive response to a question does not necessarily disqualify you from diving. A positive response means that there is a preexisting condition that may affect your safety while diving and you must seek the advice of your physician prior to engaging in dive activities. Please answer the following questions on your past or present medical history with a **YES** or **NO**. If you are not sure, answer **YES**. If any of these items apply to you, we must request that you consult with a physician prior to participating in scuba diving. Your instructor will supply you with an RSTC Medical Statement and Guidelines for Recreational Scuba Diver's Physical Examination to take to your physician.

____ Could you be pregnant, or are you attempting to become pregnant?

____ Are you presently taking prescription medications? (with the exception of birth control or anti-malarial)

____ Are you over 45 years of age and can answer YES to one or more of the following?

- Currently smoke a pipe, cigars or cigarettes
- Have a high cholesterol level
- Have a family history of heart attack or stroke
- Are currently receiving medical care
- High blood pressure
- Diabetes mellitus, even if controlled by diet alone

Have you ever had or do you currently have...

____ Asthma, or wheezing with breathing, or wheezing with exercise?

____ Frequent or severe attacks of hayfever or allergy?

____ Frequent colds, sinusitis or bronchitis?

____ Any form of lung disease?

____ Pneumothorax (collapsed lung)?

____ Other chest disease or chest surgery?

____ Behavioral health, mental or psychological problems (Panic attack, fear of closed or open spaces)?

____ Epilepsy, seizures, convulsions or take medications to prevent them?

____ Recurring complicated migraine headaches or take medication to prevent them?

____ Blackouts or fainting (full/partial loss of consciousness)?

____ Frequent or severe suffering from motion sickness ?

____ Dysentery requiring medical intervention?

____ Any dive accidents or decompression sickness?

____ Inability to perform moderate exercise?

____ Head injury with loss of consciousness in the past 5 years?

____ Recurrent back problems?

____ Back or spinal surgery?

____ Diabetes?

____ Back, arm or leg problems following surgery, injury or fracture?

____ High blood pressure or take medicine to control blood pressure?

____ Heart disease and/or attack?

____ Angina, heart surgery or blood vessel surgery?

____ Sinus surgery?

____ Ear disease or surgery, hearing loss or problems with balance?

____ Recurrent ear problems?

____ Bleeding or other blood disorders?

____ Hernia?

____ Ulcers or ulcer surgery ?

____ A colostomy or ileostomy?

____ Recreational drug use or treatment for, or alcoholism in the past 5 years?

The information I have provided about my medical history is accurate to the best of my knowledge. I agree to accept responsibility for omissions regarding my failure to disclose any existing or past health condition.

Date:

Signature: