

Maldivian Coral Reef Restoration Workshop

IV Edition - 28/01 - 04/02/2023

Led by Dr. Phanor H. Montoya-Maya and Dr. Simone Montano



Marine Research and
MaRHE
High Education Center



IN PARTNERSHIP WITH

CORALES
-de Paz-

CORAL
RESTORATION
FOUNDATION



Introduction

Why this workshop?

Coral reefs are a complex and productive ecosystem that encompasses the highest biodiversity of any marine ecosystem. To date, we have lost most of the global coral-reef systems worldwide due to overfishing, coastal development, sedimentation, marine-based pollution and climate change. This has resulted in the loss of valuable ecosystem services and the livelihoods of millions of people. Although traditional conservation management measures such as the designation of marine protected areas (MPA) do work, this passive strategy has effects at a slow pace and it alone cannot curb reef degradation by natural disturbances even once the disturbance has ended. Consequently, there is a growing demand for active reef restoration measures that can complement traditional conservation efforts and kickstart the recovery of this ecosystem.

Coral Reef Restoration has become particularly important in the Republic of Maldives which consists entirely of coral reefs that are significant on a global scale, being the 7th largest in terms of area, contributing up to 5% to the world's reefs.

The two-step "coral gardening" approach to active reef restoration is a promising tool for accelerating reef recovery, and building reef resilience. The first step entails generating a pool of colonies farmed in underwater nurseries until they reach a suitable size. The second step is the outplantation of the nursery-grown colonies onto denuded reef areas. Because this approach allows for the mariculture of naturally resilient coral genotypes that can be used to rehabilitate degraded reefs, the coral gardening concept is being considered as an adaptive tool against climate change impacts.

The 4th Edition of the Maldivian Coral Reef Restoration Workshop is your opportunity to gain hands-on experience on this active strategy for coral reef conservation.



About the Maldivian Coral Reef Restoration Workshop

During the previous editions of Maldivian Coral Reef Restoration Workshop in 2017, 2018 and 2019, an intense activity started. Several coral nurseries were built and populated with over 1000 coral fragments. In the 2019 edition about 750 fragments have been outplanted, with most of them in an in-situ science-based experiment. In the 2023 version of this intensive 8-day, 80-hour, hands-on, in-water training we will introduce a new nursery type to the toolbox of available nurseries for growing corals underwater in the Maldives, the Coral Tree™. Also, we will focus on the outplanting of coral fragments with the use of various techniques (i.e., cement, epoxy, coral clips, nails, etc). In addition to current best practices for coral reef restoration, the workshop will provide an experience on building and maintaining shallow water fixed and floating nurseries, growing different coral species for reef restoration, selecting and preparing sites for coral outplanting, and assessing the ecosystem response to coral transplantation.

The workshop will be divided into a series of classroom lessons and field activities. It will be coordinated by Dr. Simone Montano and Dr. Phanor H Montoya-Maya. Dr. Montano is a researcher at the University of Milano-Bicocca and Vice-Director of the MaRHE Center. His main interests are towards the ecology and biology of the coral reef ecosystem focusing on the assessment of coral health and diseases, with particular attention on new and emerging coral symbioses. Dr. Phanor H Montoya-Maya, a certified Ecological Restoration Practitioner by the Society for Ecological Restoration, who has worked for the past eight years on large-scale coral reef restoration via coral gardening in the Seychelles (USAID/UNDP-GEF-funded “Reef Rescuers: Restoring Reefs in the Face of Climate Change”), Colombia (Community-based coral reef restoration with Corales de Paz), and Florida (Restoration Program Manager for the Coral Restoration Foundation).

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



This workshop will follow up on 'Magoodhoo Island Coral Reef Restoration Project', a collaboration between Corales de Paz and the University of Milano Bicocca, and now it will bring the experience of the Coral Restoration Foundation, the largest and older coral restoration organization in the world, and developers of the Coral Tree .

What to expect

The course will consist of a series of lectures and field activities held by international researchers with experience in tropical marine environments. Classes will be held at the advanced training center. All the field works in the sea will be done by scuba diving.

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

- build Coral TreeTM nurseries,
- populate coral nurseries,
- maintain and monitor underwater coral nurseries,
- outplant corals onto a degraded reef site,
- improve your knowledge on coral identification,
- assess coral health conditions,
- assess and monitor sites for coral reef restoration,
- understand best practices for carrying out your own coral reef restoration project.

At the end of the Maldivian Coral Reef Restoration Workshop – 4 Edition – the University of Milano-Bicocca will release a digital certificate – Open Badge – to recognize the participant's skills and achievements on coral reef restoration (Coral Restoration Technique) .

For more details, please visit: www.openbadges.org and <https://bestr.it/badge/show/400?ln=en>



Daily Program*

* The program may be subject to changes, due to weather conditions or other problems

DAY 1

- Arrival to Malé International Airport, Maldives
- Transfer by speedboat to MaRHE Center, Magoodhoo Island
- Arrival in Magoodhoo island and accommodation
- Dinner
- Briefing on the next day activities

DAY 2

- Land Session 1: Review of reef ecology
- Open Water Session 1: Diving skills check
- Open Water Session 2: Nursery site assessment and fragment collection
- Land Session 2: Nursery selection, construction, and deployment
- Land Session 3: Construction of Coral Tree™ Nurseries
- Recap & Briefing on the next day activities

DAY 3

- Open Water Session 3: Nursery deployment and stocking
- Land Session 4: Monitoring nursery-grown colonies
- Open Water Session 4: Nursery maintenance & fragment monitoring
- Land Session 5: Data capture and analysis for nursery monitoring
- Recap & briefing on the next day activities

DAY 4

- Land Session 6: Techniques for outplanting corals
- Open Water Session 5: Outplanting by cementing
- Open Water Session 6: Outplanting by other techniques
- Open Water Session 7: Outplanting by other techniques (contd.)
- Recap & Briefing on the next day activities



DAY 5

- Land Session 7: *Introduction to micro-fragmentation*
- Open Water Session 8: *Collection of colonies for micro-fragmentation*
- Open Water Session 9: *Reef rehabilitation by micro-fragmentation*
- Land Session 8: *Monitoring coral outplanting with photomosaics*
- Recap & Briefing on the next day activities

DAY 6

- Land Session 9: *Preparing for monitoring outplanted colonies*
- Open Water Session 10: *Monitoring outplanted colonies with photomosaics*
- Land Session 10: *Processing and analyses of photomosaics in restoration*
- Recap & Briefing on the next day activities

DAY 7

- Open Water Session 11: *Recovery dive*
- Land Session 11: *Group presentation of monitoring results*
- Final Recap

DAY 8

- Departure from Magoodhoo to Malé airport

DIVING REQUIREMENTS

Each participant must have a diving license with a minimum of 20 logged dives or a minimum of 15 logged dives of which the last 5 performed in the 6 months preceding 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. This must be obtained before travelling to the Maldives.



Useful information

DOCUMENTS

Travelling to the Maldives requires a passport, with at least 6 months of validity from your departure from the Maldives and 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 sportive clothes.

It is recommended to avoid too skimpy clothing, as the island of Magoodhoo is not a tourist destination and local costumes are those of an Islamic country.

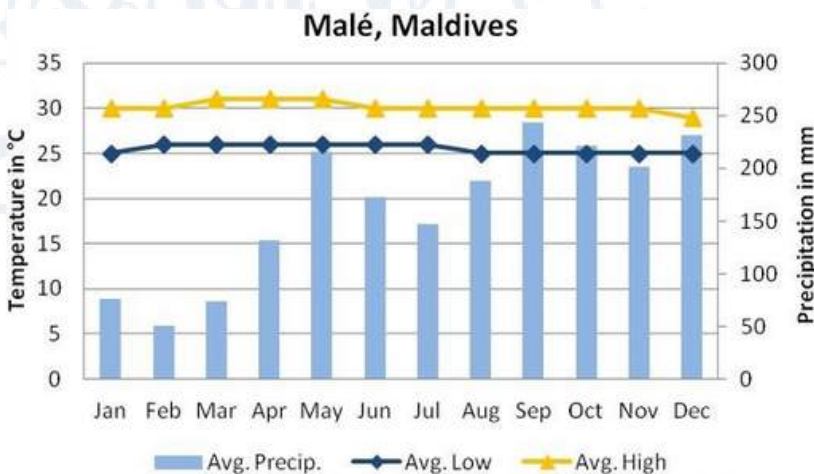


Fig1. Monthly air temperature (°C) recorded in Maldives and monthly averages of sunny and rainy hours recorded in Maldives.

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

- mask;
- snorkel;
- fins (booties);
- wetsuit;
- diving computer;

It is possible to rent diving equipment on site, depending on size and availability. Please inform us in advance in case you need this.



ACCOMMODATION AND MEALS

The accommodation is organized at the Centre, in multiple 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. Special dietary requirements and allergies are to be mentioned in the application form.

HEALTH

No vaccination is required for travellers coming to Maldives from Europe. However, each participant should take care of this aspect in order to enter the country.

SAFETY

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

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.

CURRENCY

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

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



Costs and registration

COSTS

The cost of the IV Edition of the Maldivian Coral Reef Restoration Workshop 2023 is:

- 1500 Euro for students (regularly registered at any university course)
- 1700 Euro for non students

The above amount includes:

- boat transfer from/to Malé airport;
- transfers for all the activities envisaged under the internship program;
- room and food 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 will have to fill in the following Google Form:

<https://forms.gle/m2aFfXgS4W9Qsb819>

After completing the above questionnaire, we ask you to send an email to the address workshop.marhe@unimib.it specifying in the subject: "Name Surname – Registration Coral Restoration Workshop IV Edition" and attach a .jpg color copy of your passport naming the file CRR23_Surname_Name_PPT, plus your CV.

IMPORTANT: YOU WILL HAVE TO WAIT FOR OUR CONFIRMATION BEFORE PURCHASING YOUR FLIGHTS.



The workshop will be activated once a minimum number of participants has been reached, thereafter we will give you the green light to purchase the flights and we will send you the invoice after which you can proceed with the payment of the workshop fee.

The registration deadline is fixed for 15 December 2022. The maximum number of participants is set to 16-20 people.

FLIGHTS

You will be responsible for purchasing the flight. The choice of the airline is yours, the important thing is to be at the airport on the day and at the time established (we will share with you the necessary information once registered). Pay attention while purchasing the flight tickets as your mistakes (incorrect flight dates or other) cannot be reimbursed.

Furthermore, it is necessary to send us a copy of the air ticket by 20 December 2022 to be able to proceed, if necessary, to the entry visa request, of which we will deal entirely.

IMPORTANT NOTES

Please wait for our confirmation before purchasing the flights.

THIS IS A WORKSHOP THAT REQUIRES A SCUBA DIVING CERTIFICATE FOR THE ENROLMENT.

There will be a recognition of training credits for students on the International master's programme in Marine Sciences (University of Milano-Bicocca). In particular, for such students the set of all the activities carried out during the workshop can reach a total of 4 CFU (practical training).

Students enrolled in other degree programmes and/or other universities are required to inquire at their teaching secretary.

For any information please contact us at workshop.marhe@unimib.it



MEDICAL STATEMENT

Please carefully read the medical statement which you will need to fill only once on the island of Magoodhoo. Should you reply YES to any of the questions, you are required to present a medical certificate following a Physical Examination by your physician. This must be obtained before travelling to the Maldives.

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: