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VOLUME 167

AsianDiver

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30 ADEX years

THE ALLURE OF THE PEARL

DEDICATED TO THE
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AsianDiver VOLUME 167 THE BIG BLUE BOOK

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Photo: 谢飞

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CHINA INTERNATIONAL EXHIBITION CENTER
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DRONE PHOTOGRAPHY OF THE YEAR

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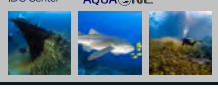

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PUBLISHER'S NOTE

OCEAN VISION, MISSION & FESTIVAL

Since its establishment in 1995, the Asia Dive Expo (ADEX) has seen remarkable growth. Under the guidance of Asian Geographic Magazines, which took over in 2010, this growth has been exponential, with our show becoming the largest and longest-running in Asia. Over the past 15 years, my vision has been to transform ADEX into more than just a dive show. I wanted to create a platform that would bring together individuals connected to the ocean, fostering learning, increasing awareness, and spreading the message of marine protection and conservation.

To achieve these goals, we have encouraged educated and well-informed new divers to serve as role models, appointed ambassadors to inspire change, and invited influential figures in our industry to place a spotlight on endangered marine animals and address threats facing our oceans such as climate change and marine plastic pollution. In doing so, we have aimed to forge ahead as an industry, nurturing a vibrant community that is progressive in its thinking and actions, and willing to turn sustainability ambition into action.

Thanks to the success of our Singapore-based shows, ADEX has expanded globally in recent years, reaching China, the Maldives, Sabah (Malaysia), the Philippines, and India, with ADEX Japan coming in October 2024. In addition, for ADEX Australia in March 2025, we will join forces with the OZTek Advanced Diving Conference to further our mission of educating, engaging and entertaining the public while promoting the protection of our oceans.

mpas EXHIBITION OF THE YEAR 2015

mpas EXHIBITION OF THE YEAR 2015

mpas EXHIBITION OF THE YEAR 2016

mpas EXHIBITION OF THE YEAR 2017

mpas EXHIBITION OF THE YEAR 2018

BEST EXHIBITION ORGANISER 2018

ADEX
SUSTAINABLE OCEAN AMBASSADOR
by the Agricultural and Food Marketing Association for Asia and the Pacific with Food and Agriculture Organization of the United Nations

Sustainable Ocean Ambassador

PUBLISHER — **CEO**

ASIAN Geographic | AsianDiver | SCUBADIVER australasia+oceanplanet | underwater 360.asia DIVERS' DIGEST

ONE OCEAN, ONE LOVE ADEX OCEAN VISION

ACHIEVEMENTS & APPRECIATIONS THROUGH THE YEARS

2011

TIMOR-LESTE DIVE PHOTO CONTEST
Appreciation Plaque from **José Ramos-Horta,** President of Timor-Leste

John Thet (*Asian Diver*) For the invaluable support given to the Timor-Leste Dive Photo Contest

2014

MEDIA PUBLISHERS ASSOCIATION OF SINGAPORE (MPAS) AWARDS 2014
Publisher of the Year
John Thet

ASIA DIVE ACADEMY AWARDS 2014
Silent Hero of Marine Conservation
John Thet

2015

MEDIA PUBLISHERS ASSOCIATION OF SINGAPORE (MPAS) AWARDS 2015
Publisher of the Year
John Thet

ASIA DIVE ACADEMY AWARDS 2015
Dive Industry Publisher of the Year
John Thet

2016

ASIA DIVE ACADEMY AWARDS 2016
Top Marine Conservationalist
John Thet

MORE THAN JUST A DIVE SHOW

As we celebrate our 30th jubilee, I would like to extend a special mention to the people that have dedicated their lives to the advancement of the dive industry. These trailblazers and innovators – instructors, operators, manufacturers, explorers, scientists, filmmakers, and photographers, among many others – have played significant roles in shaping the industry into what it is today. It brings me great joy to know that once again many of them will be joining us in Singapore for ADEX Ocean Festival 2024.

As serendipity would have it, it is in this milestone year that I will be inducted into the International Scuba Diving Hall of Fame, recognition from a prestigious organisation that is not only extremely humbling but also fills me with immense gratitude that my work and vision have been acknowledged. I am very proud to be the fifth and possibly youngest Asian recipient of this unexpected honour.

Over the years, I have formed countless strong friendships and built an extensive network of like-minded individuals who have offered unwavering encouragement and support. I am truly grateful for their presence in my life. Additionally, I must express my deepest gratitude to the Underwater360 team, dedicated individuals who have worked tirelessly to bring my vision to life. It is with great pleasure that I share this accolade with them.

One Ocean, One Love

JOHN THET
International Scuba Diving Hall of Fame 2024
CEO, Asia Dive Expo (ADEX)
Founder, Underwater 360 / Asian Geographic Society
Historical Diving Society Asia / Ocean Citizen
Publisher, Asian Geographic Magazines Pte Ltd

2011

2018

2022

FOUNDER

underwater 360

ASIAN Geographic SOCIETY ONE ASIA, ONE HEART

HISTORICAL DIVING SOCIETY ASIA

ONE OCEAN, ONE LOVE Ocean CITIZENS

INTERNATIONAL SCUBA DIVING HALL of FAME

2017

KOREAN PUBLIC ART ASSOCIATION
Appreciation Award
John Thet
(Underwater360)
Contribution to work on listing the culture of *haenyeo* women divers as UNESCO Intangible Cultural Heritage

2018

MERMAID FEDERATION INTERNATIONAL
Appointment of **John Thet** as the Honourable Advisor 2018–2020
Contribution towards marine conservation and guidance for MFI

2022

THE MALDIVES TOURISM MINISTER **presented John Thet** with the prestigious Maldives 50th Anniversary Gold Coin, symbolising deep appreciation for his extraordinary contribution to the thriving field of Maldives Marine Tourism

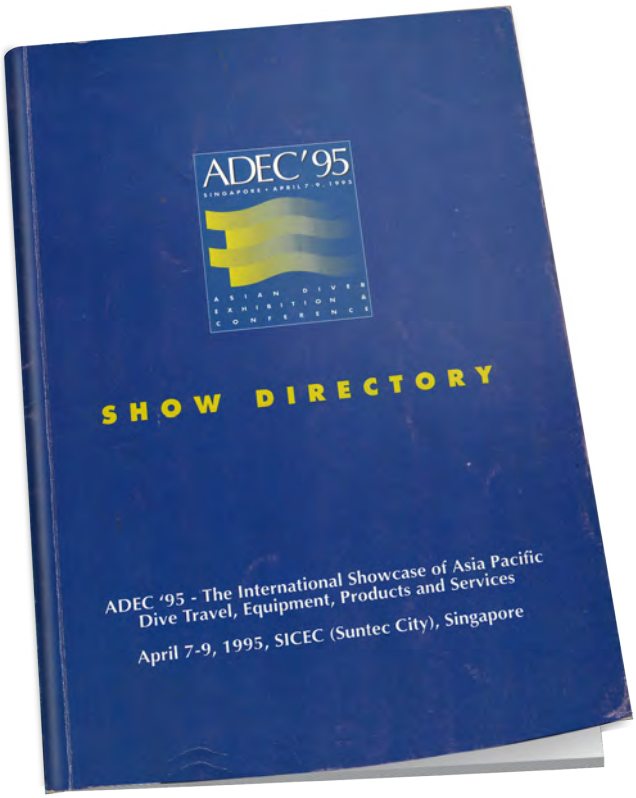
2024

John Thet has been bestowed the prestigious honour of being inducted into the International Scuba Diving Hall of Fame (ISDHOF), solidifying his position as one of the representatives from Asia. This remarkable achievement places him as the fifth Asian individual to receive this esteemed recognition, and quite possibly the youngest luminary in the industry to garner such a distinction

JOIN US IN COMMEMORATING THE REMARKABLE ACHIEVEMENTS OF THE PEARL JUBILEE: AN INCREDIBLE JOURNEY OF 30 INVALUABLE YEARS FOR GROWTH, LEADERSHIP, AND MOTIVATION.

ASIA'S LEADING DIVE HUB CELEBRATES

30 ADEX years



ADEC 1995
First Show Guide

ASIA'S FIRST DIVE SHOW

TIMELINE

ADEX 1995–1998
(4 YEARS)
Founded and managed by *Asian Diver* (Publisher, Rainer Sigel) and Chris Sweeting (Managing Director, Asia Business Press) in Singapore

ADEX 1999–2003
(5 YEARS)
Bangkok RAI Exhibitions Thailand

ADEX 2004–2007
(4 YEARS)
Suntec Integrated Media Singapore

ADEX 2008–2009
(2 YEARS)
TMX Show Productions Singapore

ADEX 2010–PRESENT
(15 YEARS AND STILL GOING STRONG)
ADEX has been successfully led by Underwater360 since 2010, with a clear vision and mission set forth by JOHN THET, the award-winning publisher of Asian Geographic Magazines Pte Ltd

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TO DEDICATE AN ANNUAL THEME TO ENDANGERED SPECIES, HIGHLIGHTING ITS COMMITMENT TO MARINE CONSERVATION.

"THE BIG BLUE BOOK" Since **ADEX 2010**

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Dedicated to
SHARKS

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Dedicated to
TURTLES

ADEX 2012
Dedicated to
MANTA RAYS

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WHALE SHARKS

ADEX 2014
Dedicated to
CORAL REEFS

ADEX 2015
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DOLPHINS

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SEAHORSES

ADEX 2017
Dedicated to
CLIMATE CHANGE

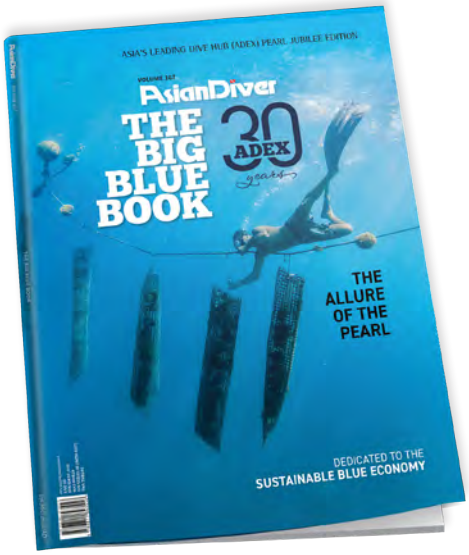
ADEX 2018
Dedicated to
SHARKS

ADEX 2019
Dedicated to
A PLASTIC-FREE OCEAN

ADEX 2020
Dedicated to
A PLASTIC-FREE OCEAN

ADEX 2022
Dedicated to
THE BLUE WHALE

ADEX 2023
Dedicated to
WOMEN DIVERS



ADEX 2024
Dedicated to
THE SUSTAINABLE BLUE ECONOMY

mpas CONFERENCE/ EXHIBITION OF THE YEAR 2015

2012
ASIAN PUBLISHING AWARDS
BEST MULTIMEDIA INTEGRATION
TO ENGAGE AUDIENCES
***Scuba Diver TTL* Issue 4/2012**

mpas event/party OF THE YEAR 2015 (merit)

2015
MEDIA PUBLISHERS ASSOCIATION OF SINGAPORE (MPAS) AWARDS 2015
EXHIBITION OF THE YEAR (GOLD)
Asia Dive Expo 2014
EVENT & PARTY OF THE YEAR (GOLD)
Asia Dive Expo 2014
SPECIAL INTEREST MEDIA OF THE YEAR
Scuba Diver OCEAN PLANET

mpas EXHIBITION OF THE YEAR 2016 (gold)

2016
MEDIA PUBLISHERS ASSOCIATION OF SINGAPORE (MPAS) AWARDS 2016
EXHIBITION OF THE YEAR (GOLD)
Asia Dive Expo 2016

mpas EXHIBITION OF THE YEAR 2017 (gold)

2017
MEDIA PUBLISHERS ASSOCIATION OF SINGAPORE (MPAS) AWARDS 2017
EXHIBITION OF THE YEAR (GOLD)
Asia Dive Expo 2016

mpas EXHIBITION OF THE YEAR 2018 (SILVER)

2018
MEDIA PUBLISHERS ASSOCIATION OF SINGAPORE (MPAS) AWARDS 2018
EXHIBITION OF THE YEAR (SILVER)
Asia Dive Expo 2017

SINGAPORE TOURISM AWARDS
BEST EXHIBITION ORGANISER 2018

SINGAPORE TOURISM AWARDS 2018
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Asia Dive Expo 2017

2019
SUSTAINABLE OCEAN AMBASSADOR
AGRICULTURAL AND FOOD MARKETING ASSOCIATION FOR ASIA AND THE PACIFIC WITH FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Asia Dive Expo (ADEX)

2022
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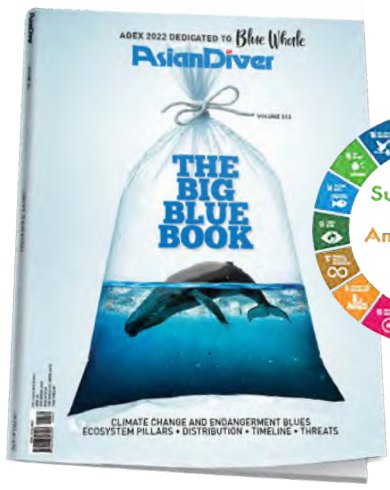
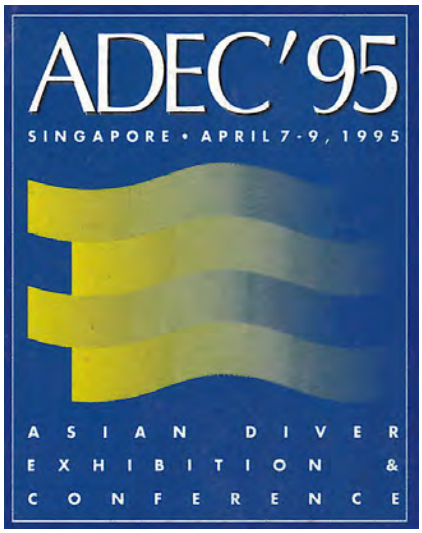
AGRICULTURAL AND FOOD MARKETING ASSOCIATION FOR ASIA AND THE PACIFIC WITH FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
***Asian Diver* Magazine**



FIRST DIVE SHOW IN ASIA

ADEC '95 – THE INTERNATIONAL SHOWCASE OF ASIA PACIFIC DIVE TRAVEL, EQUIPMENT, PRODUCTS AND SERVICES APRIL 7–9, 1995, SICEC (SUNTEC CITY), SINGAPORE.

ADEC 1995



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A competition where a distinguished panel judges the work of some of the world's best photographers and videographers in front of a live audience

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IN 2005, ADEX HOSTED ITS INAUGURAL DIVE SHOW IN CHINA, **CDEX**. MANAGED BY SUNTEC INTEGRATED MEDIA SINGAPORE

CDEX 2005

FIRST MERMAID CHALLENGE IN ASIA

THE INAUGURAL ADEX MERMAIDS CHALLENGE

ADEX Shenzhen 2017 was the proud host of this remarkable competition. As a result of this momentous event, a plethora of mermaid courses and certifications from Asia have been flourishing and gaining momentum ever since.

ADEX 2017

FIRST DIVE SHOW IN CHINA

RECOGNISED BY THE BEIJING PUBLIC SAFETY & WELFARE FOUNDATION

This appreciation was awarded to Asian Geographic Magazines Pte Ltd for their contribution and social responsibility towards orphaned and abandoned children in China.

ADEX CHINA 2019

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Pasquale Vassallo

SINGAPORE OCEAN WEEK

ADEX BLUEWAVE FESTIVAL 2025

Possibly the smartest invertebrates on the planet, these sentient, eight-armed wonders also have alien-like characteristics, and very distinct personalities. We celebrate these fascinating and marvellous creatures, and all life in the oceans, much of which remains very mysterious.

DEDICATED TO CEPHALOPODS + CELEBRATING MARINE LIFE BEHAVIOUR

Common octopus (***Octopus vulgaris***)

Caribbean reef squid (***Sepioteuthis sepioidea***)

Chambered nautilus (***Nautilus pompilius***)

Common cuttlefish (***Sepia officinalis***)

SECRETS OF THE OCTOPUS

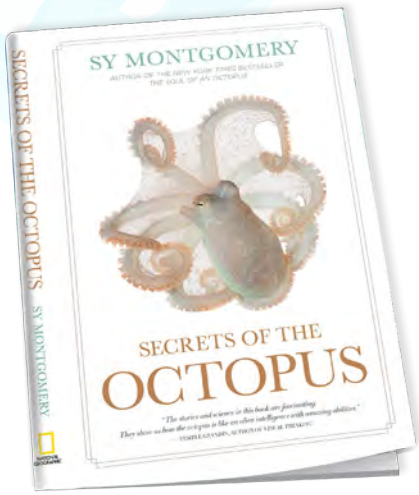
By **Sy Montgomery** and **Warren Carlyle**

Written by the beloved author of the international bestseller, *The Soul of an Octopus*, along with Warren Carlyle, founder of Octonation, an NGO that inspires wonder of our oceans and educates the world about octopuses, this companion to the highly-anticipated *National Geographic* television special, premiering in April 2024, will bring us closer than ever to these elusive creatures.

This beautiful book of images and illustrations contributed by octopus lovers around the world explores the alluring underwater world of the octopus – a creature that resembles an alien lifeform, but whose behaviour has earned it a reputation as one of the most intelligent animals on the planet.

With this offering, acclaimed author Sy Montgomery – known, thanks to her bestselling book, as the "octopus whisperer" – returns to the species she knows and loves, offering current and compassionate stories about the scientists on the front lines of octopus research and conservation.

Available at *www.penguinrandomhouse.com* and *www.amazon.com*



7 WAYS RESORTS AND DIVE CENTRES CAN SUPPORT THE BLUE ECONOMY

Text by **Julia Footnick**

At least one billion people depend on fish for their main protein source, and many economic sectors depend on the oceans: fisheries, maritime transport, scientific and technological sectors, and tourism. These resources need to be managed, so they are sufficiently protected and available for future generations, but also continue to sustain the people who rely on them today.

WHAT IS THE BLUE ECONOMY?

The expression "blue economy" was coined in 2011 to introduce the concept of a new kind of economy based on the efficient use of ocean resources for sustainable development. It became goal #14 in the UN Sustainable Development Goals for 2030: "Life Below Water – to conserve and sustainably use the oceans, seas and marine resources for sustainable development". Marine tourism, and the dive industry in particular, are important participants, significantly contributing to local economies, but also instrumental in supporting improved social wellbeing and livelihoods, and, of course, marine conservation.

Here are seven ways dive centres and resorts can be active participants in the blue economy.

1 GENERATING ECONOMIC WEALTH

Dive centres and resorts create jobs and income for local communities. They can bring wealth to remote places and provide employment opportunities for the locals. This can replace destructive practices like fishing and mining for more sustainable ones.

2 HUMAN CAPITAL

Offering career opportunities and skilled training to those from lower socio-economic backgrounds and little education are other ways dive centres can help through internship programmes. This creates opportunities and a pool of skilled workers, who can work anywhere and be an inspiration to others.

3 INCLUSIVITY AND OPPORTUNITIES FOR ALL

Hiring women and minority groups creates economic opportunities for a broader group of people and a set of different role models. It also offers a diverse way of thinking within the business for problem-solving, building emotional intelligence, better understanding and acceptance. This fosters a feeling of inclusiveness and a positive influence on mindsets.

4 RAISING AWARENESS AND EDUCATION

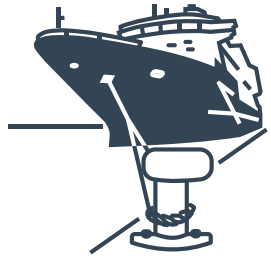
Dive tourism has a vested interest in keeping marine ecosystems healthy. Presentations, collaborations with grassroots associations, and workshops in schools are ways to actively and emotionally engage people in conserving their own precious resources.

5 MONITORING AND COLLABORATION

By diving the reefs and sites every day, dive staff are the best qualified to assess changes or degradation. Collaborating with NGOs and government bodies to report this information is valuable and necessary.

6 DATA COLLECTION USING CITIZEN SCIENCE

Many NGOs have systems where members of the public can collect and submit data about ocean conditions, wildlife and other aspects of the marine environment. Scientists can then use the data to further their research to gain a better understanding of how the oceans are changing over time. This is a great way to get people involved and actively participate in conservation.



7 TO MINIMISE IMPACT, LEAD BY EXAMPLE

Small things like building green, waste and water management and recycling, encouraging the use of reef-safe sunscreen, adding moorings instead of using anchors, among others, are small steps towards reducing our footprint and inspiring (as well as getting inspired by) others to do the same.

FINAL THOUGHTS

Dive centres and resorts face challenges like the reliance on air travel, the increased use of resources and land for tourism, and the subsequent impacts on the local communities. These need to be addressed and mitigated when planning and implementing new initiatives. AD

Julia Footnick
Julia is co-owner of Purple Dive Penida, a 5-star IDC center in Nusa Penida, Bali. With a Master's in Science in Nature Conservation from University College London, she brings over 15 years of experience as a PADI Staff Instructor and a background in community-based conservation projects in Madagascar with organisations like the Zoological Society of London and the World Conservation Society. Julia's passion for diving and conservation was ignited during beach cleanups with Trash Hero Indonesia.

Illustration of the five actions needed to unite and mobilise the diving sector to help achieve a sustainable Blue Economy and Sustainable Development Goals (SDGs), particularly SDG14. The photographs highlight some of these recommended actions: (A) When local communities gain recognition for usage rights and exclusion of destructive and extraction activities, increased biomass can lead to increased dive ecotourism. (B) The diving sector must foster a sense of community and inclusivity, particularly among the local people, women and youth. (C) The diving sector must seek investments from NGOs, governments and private financing to increase access to costly infrastructure. (D) Local communities must protect large predators and charismatic megafauna to attract lucrative Blue Tourism. (E) When local communities gain recognition, reef biodiversity and resiliency can be enhanced. (F) Modernising the diving sector will help draw additional attention to conservation and the sustainable development goals, and therefore attract more people to engage in "Life Below Water".

Source: M.J. Forrest, F. Favoretto, Z.A. Nisa & O. Aburto-Oropeza, A deeper dive into the blue economy: The role of the diving sector in conservation and sustainable development goals, *Frontiers in Marine Science* 10 (2023)

THE INTERNATIONAL SCUBA DIVING HALL OF FAME

FOUNDED IN 2000 by the Cayman Islands Ministry of Tourism, the annual International Scuba Diving Hall of Fame (ISDHF) honours and recognises those who have contributed to the success and growth of the industry in travel, entertainment, art, equipment design and development, education, explorationand adventure.

2000

STAN WATERMAN (USA)
GUSTAV DALLA VALLE (ITALY)
ALBERT TILLMAN (USA)
RON AND VALERIE TAYLOR (AUSTRALIA)
BOB SOTO (UK, CAYMAN ISLANDS)
JACK MCKENNEY (USA)
JACK W. LAVANCHY (SWITZERLAND)
DR JEFFERSON DAVIS (USA)
HANS AND LOTTE HASS (AUSTRIA)
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EMILE GAGNAN (FRANCE)
BERNARD EATON (UK)
DR SYLVIA EARLE (USA)
ELLIS ROYAL CROSS (USA)
BEN CROPP (AUSTRALIA)
JACQUES YVES COUSTEAU (FRANCE)
LLOYD BRIDGES (USA)

2002

PAUL TZIMOULIS (USA)
IVAN TORS (HUNGARY, USA)
ZALE PARRY (USA)
BOB HOLLIS (USA)
DAVID DOUBILET (USA)
JOHN CRONIN (USA)

2003

FRANK SCALLI (USA)
JORDAN KLEIN SR (USA)
FRÉDÉRIC DUMAS (FRANCE)
JEAN-MICHEL COUSTEAU (FRANCE)
CHUCK BLAKESLEE AND JIM AUXIER (USA)

2004

CAPT SPENCER SLATE (USA)
KENDALL MCDONALD (UK)
JERRY GREENBERG (USA)
MIKE BALL (AUSTRALIA)
DICK ANDERSON (USA)

AKIRA TATEISHI (JAPAN)

2005

CAPT DON STEWART (USA, BONAIRE)
ANDREAS B RECHNITZER (USA)
ERNIE BROOKS II (USA)
DEWEY BERGMAN (USA)

2007

CARL ROESSLER (USA)
PAUL HUMANN (USA, CAYMAN ISLANDS)
RODNEY FOX (AUSTRALIA)
RALPH ERICKSON (USA)
NEVILLE COLEMAN (AUSTRALIA)

AKIRA TATEISHI (1930–2021) was the editor and publisher of several magazines, and a leader in the diving community in Japan. For more than five decades, he helped focus Japanese and international attention on underwater photography through movies, television, magazines, and newspapers. While in university, he discovered a passion for painting, for which he had won many awards. For more inspiration, he began diving in 1956. He built his own underwater camera housing to photograph what he observed underwater. Soon enough, Akira discovered a new avenue for his artistic expression. In 1958, he merged his love of art and the ocean, and founded the Marine Art Centre. Many films, art exhibitions and publications later, he initiated the Marine Diving Fair in Japan, in 1993. He was **THE FIRST ASIAN** inducted in the International Scuba Diving Hall of Fame.

ASIA'S FIRST ISDHF INDUCTEE

2008

RON STEVEN – ROGEST (CANADA)
DR DREW RICHARDSON (USA)
DANIEL MERCIER (FRANCE)
BOB HALSTEAD (AUSTRALIA, PNG)
CATHY CHURCH (USA, CAYMAN ISLANDS)

2009

LARRY SMITH (USA, INDONESIA)
HOWARD ROSENSTEIN (USA, ISRAEL)
GERI MURPHY (USA)
KIMIUO AISEK (CHUUK)

2010

WYLAND (USA)
FRANCIS TORIBIONG (PALAU)
NICK ICORN (USA)
DR EUGENIE CLARKE (USA)

2011

ALLAN POWER (AUSTRALIA, VANUATU)
BEV MORGAN (USA)
ANDRE LABAN (FRANCE)
HOWARD AND MICHELE HALL (USA)

CLEMENT LEE (MALAYSIA)

Anyone worth knowing and owed any respect from the Asian diving community will have to be **CLEMENT LEE**. He was the former founding partner of Borneo Divers and the first Malaysian PADI Course Director, throwing a deep and powerful influence over the growth and development of recreational diving and tourism. He may have retired in 2012, but that has not stopped him from advocating for the conservation and protection of the region's marine environment. Clement was inducted into the International Scuba Divers Hall of Fame in 2011 and received a "Lifetime Achievement Award" at ADEX 2014, Asia's largest dive show.

2012

ARMAND AND JOANN ZIGAHN (USA)
KELLY TARLTON (NEW ZEALAND)
LESLIE LEANEY (UK, USA)
RON KIPP (USA, CAYMAN ISLANDS)
CLIVE CUSSLER (USA)
RIC AND DO CAMMICK (NEW ZEALAND, FIJI)

2013

ROLF SCHMIDT AND PETRA ROEGLIN (GERMANY, EGYPT)
BERT KILBRIDE (USA, BRITISH VIRGIN ISLANDS)
GUY HARVEY (JAMAICA, CAYMAN ISLANDS)
SAM DAVISON (USA)

2014

NEAL WATSON (USA, BAHAMAS)
ALESE AND MORT PECHTER (USA)
DAN ORR (USA)
CHUCK NICKLIN (USA, YAP)
BILL ACKER (USA)

2015

WALLY MULLER (AUSTRALIA)
DR JOSE JONES (USA)
PETER HUGHES (SCOTLAND)
BILL HIGH (USA)
DIMITRI REBIKOFF (FRANCE)

2016

PHILIPPE COUSTEAU SR (FRANCE)
DR JOE MACINNIS (CANADA)
STUART COVE (USA, BAHAMAS)
RAMON BRAVO (MEXICO)
BOB BARTH (USA)

2017

GARDNER YOUNG (USA, BAHAMAS)
KURT SCHAEFER (AUSTRIA)
KROV MENUHIN (AUSTRALIA)
DICK BONIN (PADI, USA)

< Clement Lee (right) receives the ISDHF Award from former Cayman Island Director of Tourism, Kenneth V Bryan

2018

CAPT PHILIPPE TAILLIEZ (FRANCE)
DICK RUTKOWSKI (USA)
BORIS POROTOV (KAZAKHSTAN)
WULF H KOEHLER (GERMANY)
STEPHEN FRINK (USA)

DR HS BATUNA (INDONESIA)

DR HS BATUNA (1938–2014, Honoured Posthumously) was a visionary medical doctor and diver who, over several decades, successfully developed a recreational diving operation and resort in Manado, Indonesia. He was the first scuba diver in North Sulawesi, and found many of the sites that have become internationally famous in Bangka, Manado, Bunaken and Lembeh. He was instrumental in providing the only recompression chamber in Manado, and the first to start marine conservation work in the area. The dive tourism community in North Sulawesi started largely as a result of his vision, tenacity and generosity. He dedicated much of his life to improving the thousands of lives he touched.

2019

DR ADEL MOHAMED TAHER (EGYPT)
LEE SELISKY (USA)
JONATHAN BIRD (USA)

HUSSAIN 'SENDI' RASHEED (REPUBLIC OF MALDIVES)

HUSSAIN RASHEED (popularly known as Sendi Rasheed) was the first PADI Instructor Trainer in the Republic of Maldives and a key figure in developing the dive tourism there. During his career, which is on-going, he has certified over 1,600 divers. He is active in developing regulations for the Maldives and works to assist in marine environmental projects. His work came to international media attention when he created and organised an underwater Cabinet Meeting, chaired by the President of the Republic of Maldives, to bring the threat of global warming to the world's attention. He was the former Dean of the Faculty of Marine Studies at Villa College (2006–2008), and oversaw four departments: Marine Science, Watersports, Scuba Diving and Marine Medicine. He is affiliated as an Executive Director of all Villa Dive Centres under his company, Dive Oceanus, operating five PADI dive centres across four different atolls in the Maldives, and supervises over 40 dive professionals. He is a founding member of the Divers Association Maldives (DAM).

2020

DIVERS ALERT NETWORK (DAN) (USA)
JIM GATACRE (CANADA)
AVI KLAPFER (ISRAEL, COCOS ISLANDS)
TOM INGRAM (USA)
JILL HEINERTH (CANADA)

List courtesy of **LESLIE LEANEY**
ADEX Ambassador for Diving History
Former first Executive Director of
ISDHF 2003–2022

2024

MARGO PEYTON (USA)
CLAUDIO GUARDABASSI (BRAZIL)
ENRIC SALA (SPAIN)

JOHN THET (OCEAN CITIZEN)

JOHN THET possesses extensive practical business expertise in media publishing and event management, accumulating almost three decades of experience. As the Publisher and CEO of Asian Geographic Magazines Pte Ltd, his exceptional leadership has propelled the company to unparalleled success, securing nearly 90 prestigious awards in both the publishing and creative domains. A highly versatile individual, John consistently seeks fresh and innovative content, continuously striving to showcase the wonders of Asia. Under his guidance, the organisation has achieved remarkable growth by combining their foundational content with groundbreaking ideas. Recognising his outstanding contributions, MPAS honoured John with the distinguished title of **"Publisher of the Year"** in **2014, 2015**, and **2018**. In addition, Asian Geographic Magazines Pte Ltd was bestowed the accolade of **"Best Exhibition Organiser"** in **2018** by the Singapore Tourism Board. Moreover, ADEX was given the title of **"Sustainable Ocean Ambassador"** by the United Nations in **2019**. John is also the founding member of several influential organisations, including the **Asian Geographic Society**, **Ocean Citizens** (dedicated to education about the ocean), **Historical Diving Society Asia** (committed to preserving and promoting diving history in Asia), and **Underwater360** (Asia's largest dive hub).

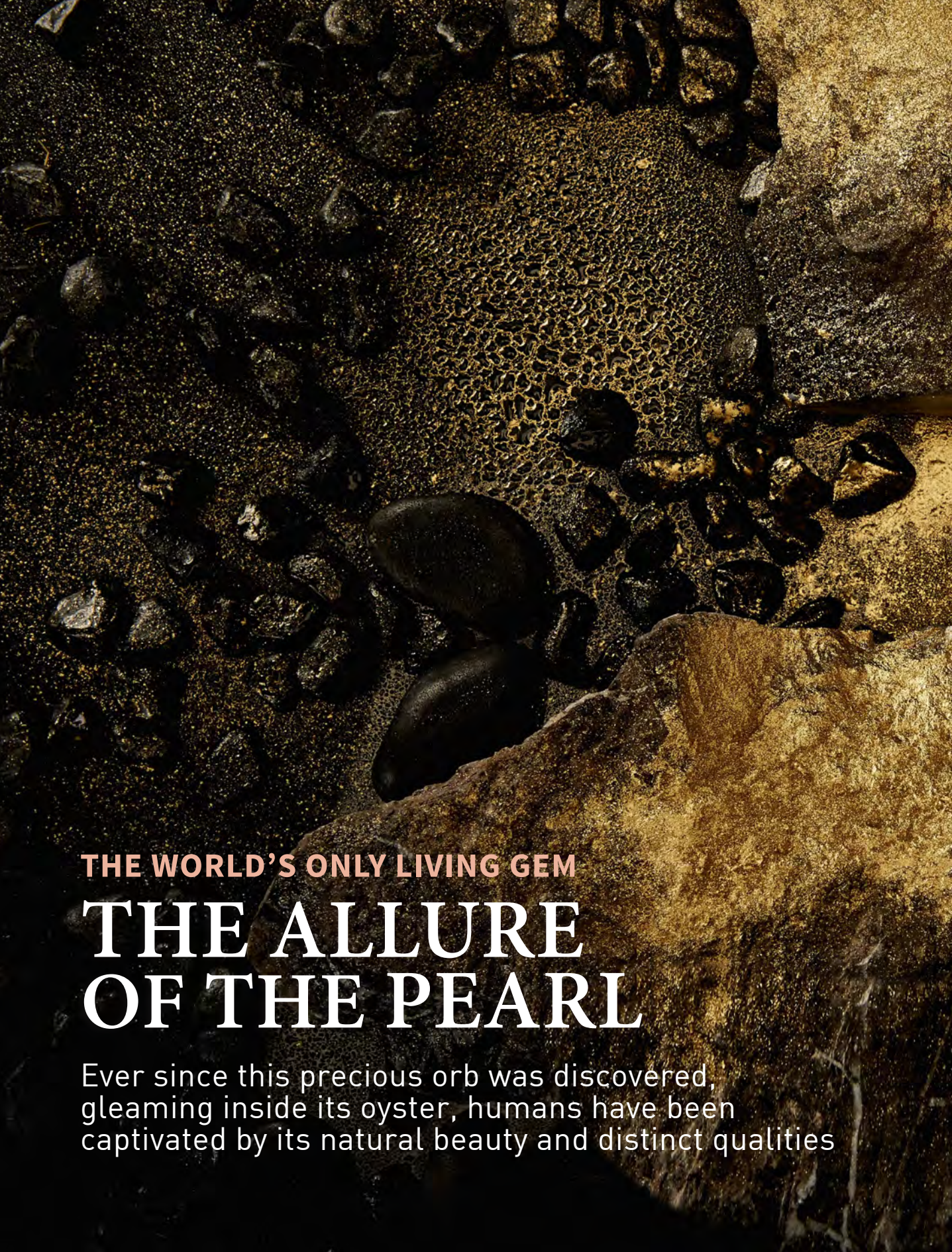
On September 28, 2024, John will be inducted into the **International Scuba Diving Hall of Fame (ISDHF)**, an extraordinary honour that solidifies his position as one of the representatives from Asia. This remarkable achievement places him as the fifth Asian individual to receive this recognition, and quite possibly the youngest luminary in the industry to garner such a distinction. AD

< John Thet is the fifth, and the youngest, Asian to be inducted into ISDHF

Executive Directors of the International Scuba Diving Hall of Fame

2024–Present
William Cline

2003–2022
Leslie Leaney
(The first Executive Director)



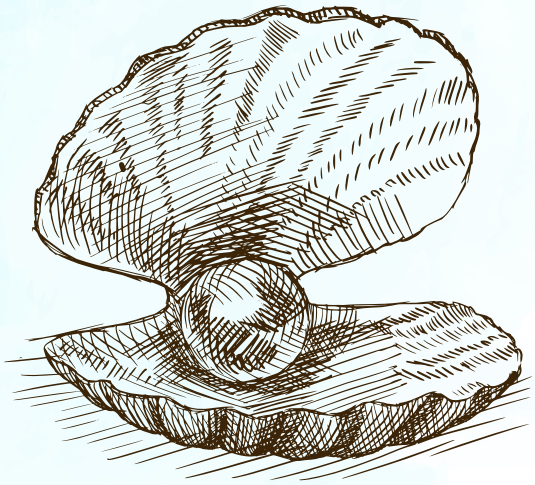
THE WORLD'S ONLY LIVING GEM

THE ALLURE OF THE PEARL

Ever since this precious orb was discovered, gleaming inside its oyster, humans have been captivated by its natural beauty and distinct qualities

A freshwater pearl oyster can produce more than one pearl at a time

Shutterstock



A TIMELESS TREASURE

People believe the first pearls were discovered by those looking for food along the seashore. As the world's oldest gem, revered long before written history, pearls were the first treasures coveted by ancient Chinese, Persian and Roman civilisations, but because they were rare and expensive, it was only the very wealthy who could afford them. Throughout the ages, pearls have been associated with purity and femininity. These lustrous orbs, prized for their beauty and rarity, used in jewellery and adornments for centuries, have shown no signs of waning in popularity.

A SYMBOL OF BEAUTY, GRACE AND SOPHISTICATION

In many cultures, pearls graced the necks of royalty and nobility, who considered them a mark of prestige and status. Their timeless appeal is apparent in both the classic and contemporary world of fashion and jewellery designs. Today, pearls are not just a symbol of luxury, but a versatile accessory that can be worn in various styles, adding a touch of elegance to any ensemble.

wikipedia

IT ALL BEGINS WITH A GRAIN OF SAND...

Pearls are formed inside the shells of certain molluscs when an irritant, such as a grain of sand, enters the shell. The mollusc secretes layers of nacre, a combination of calcium carbonate and proteins, to coat the irritant and create a pearl.

"In many cultures, pearls graced the necks of royalty and nobility, who considered them a mark of prestige and status. Their timeless appeal is apparent in both the classic and contemporary world of fashion and jewelry designs."

<

Known to foreigners as the Pearl Concubine, Lady Zhen was the royal consort to the Guangxu Emperor (1871–1908), the 10th emperor of the Qing Dynasty

TYPES OF PEARLS

Pearls fall into two main categories – natural and cultured. Natural pearls are the rarest and most valuable, take years to form, and are found in the wild. Only one in every 10,000 oysters will produce a pearl spontaneously. Of that number, even fewer will be round and lustrous enough for fine quality jewellery, making them sought after by collectors and enthusiasts. Natural pearls are less round and smaller than their cultured counterparts. In the wild, pearl-producing molluscs have a much slimmer chance of creating a fully-developed pearl due to natural predators or poor water conditions.

^
A mother-of-pearl shell on the seabed

Cultured pearls involve the human element of artificially inserting a small bead or tissue into the mollusc to trigger pearl formation, under very controlled conditions. The pearls produced are still genuine and made of nacre. Cultured pearls can be found in a variety of shapes, sizes and colours, and are more readily available and affordable, compared to natural pearls.

TYPES OF CULTURED PEARLS

The introduction of cultured pearls in the 1900s turned the pearl industry on its head, causing the value of natural pearls to plummet initially. Today, nearly 99 percent of all pearls in the market are cultured. Natural pearls are rare now, and are obviously more valuable.

AKOYA PEARLS

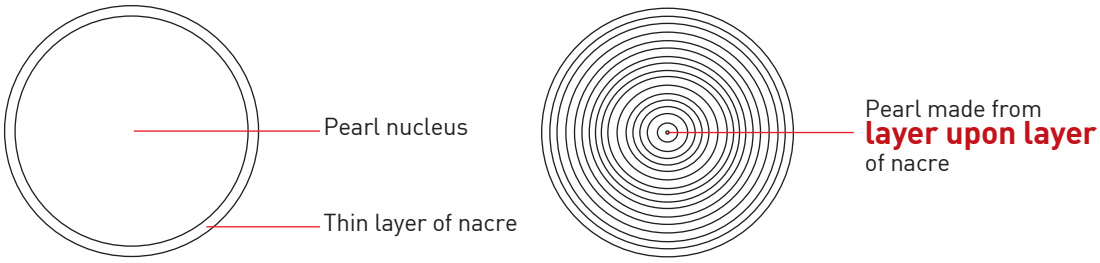
Japanese entrepreneur Kokichi Mikimoto, son of a noodle maker, created the first perfectly round, cultured pearl in 1893, and began farming them in 1916. Hewas responsible for the boom in the cultured pearl industry in Japan and the world.

^ Kokichi Mikimoto inserts a nucleus in a pearl shell

v Tools used to inseminate an oyster to produce a cultured pearl

At the beginning, he had to constantly defend against accusations that his pearls were not "real". But scientists concurred that these pearls had the exact same properties as those formed naturally, with the only difference that humans "assisted"

Internal Structure of a Cultured and Natural Pearl



Cultured Pearl **Natural Pearl**

in their creation under controlled conditions. It finally became widely accepted that cultured pearls were just as valuable as natural ones.

The classic white pearls sought by customers are produced by the Akoya oyster, *Pinctada fucata*. These pearls are typically farmed in colder water than other marine-cultured pearls, and have a thin nacreous coating. Akoya pearl farming is now present in Japan, China, Vietnam and the UAE.

v
A pearl farm employee "surgically" implants an irritant in the oyster to trigger the formation of a pearl

Shutterstock

^ A cultured pearl straight out of the oyster shell

v A string of lustrous, South Sea cultured pearls on display

Shutterstock

SOUTH SEA PEARLS

These pearls are larger and thicker than the Akoya pearls, because the oyster, *Pinctada maxima*, in which they grow, are bigger, and the long growth period allows more nacreous overgrowth. They also come in a variety of colours, from a pearly white to silver, even champagne and gold-tinted ones, depending on the oyster. Where Akoya pearls rarely come in sizes greater than 10 millimetres, South Sea pearls can easily reach sizes of up to 20 millimetres. These pearls are cultivated in Australia, Indonesia, the Philippines and Myanmar.

"Where Akoya pearls rarely come in sizes greater than 10 millimetres, South Sea pearls can easily reach sizes of up to 20 millimetres. These pearls are cultivated in Australia, Indonesia, the Philippines and Myanmar."

Shutterstock

BLACK PEARLS

Also known as Tahitian pearls, black pearls were successfully cultivated from the black-lipped oyster, *Pinctada margaritifera*, in French Polynesia in 1961. Though they are termed "black", they really produce an incredibly wide range of iridescent colours, and can be found in a variety of shapes and sizes, ranging from six to 20 millimetres. Today, they are farmed in French Polynesia, Mexico, Fiji and Micronesia.

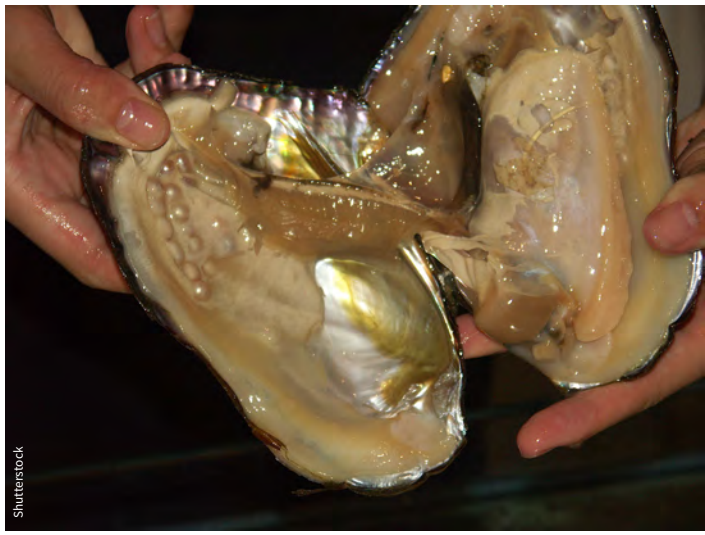
^
A black pearl is cultivated from the *Pinctada margaritifera* oyster

v
Black pearls in various iridescent hues on display on a mother-of-pearl shell

FRESHWATER PEARLS

These gems are cultivated in freshwater mussels, *Hyriopsis cumingii*, in rivers, lakes and ponds. Although it was first started in Japan, China is now the leading producer of freshwater pearls. It is the only tissue-nucleated (instead of the bead) cultured pearl in the world that produces solid, crystalline nacre, making it incredibly durable. The entire soft body of the mussel is seeded with multiple donor tissues on each side of the shell, and one mussel can produce as many as 50 pearls at a time! The sheer volume of pearls produced has certainly overshadowed any other type of cultured pearl in the world.

One other special characteristic of freshwater pearls is their highly irregular shapes. Solid-nacre pearls do not have the "nucleus template" to form the perfectly round shape of marine-cultured pearls, so the majority of freshwater harvests produce baroque pearls. This irregular, uneven nacreous coating makes them one-of-a-kind. Cultured seawater pearls can also be baroque, but tend to be teardrop-shaped because of the spherical "irritant" introduced into the oyster.

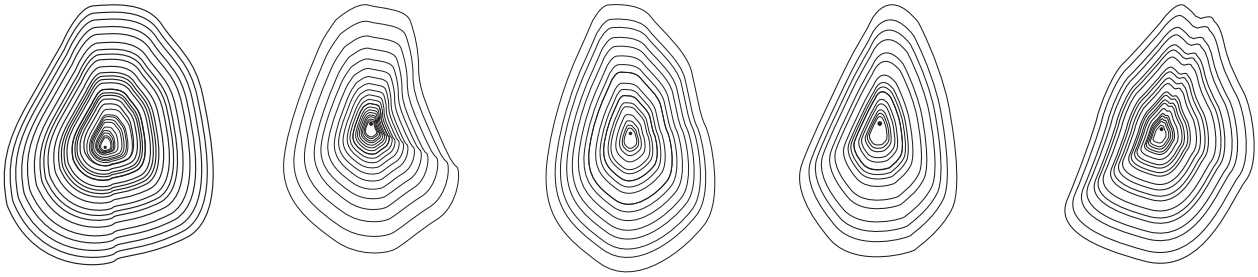


^
^
Cultured freshwater pearls inside a live mussel

^
One mussel can produce multiple pearls at a time

< >
Freshwater pearls

Internal Structure of a Baroque Pearl



THE QUALITY OF A PEARL DEPENDS ON

Size

Colour

Shape

Lustre

Lustre comparison of freshwater pearls

* The thickness of the nacre not only determines the pearl's lustre, but also how long it will last

THE HARVESTING PROCESS

Pearl Hunting was prevalent in the Persian Gulf and Japan for thousands of years, and in Western Australia since the 1850s. Historically, the only means of obtaining pearls was by gathering large numbers of oysters and mussels from the seabed, surfacing with them and searching through the tissues of these bivalves for the precious orbs.

The probability of actually finding a pearl was very low, and pearl hunters had to sift through tonnes of molluscs just to find three to four viable pearls, discarding the shells as they went – inadvertently endangering the mollusc population after centuries of this practice.

> A 14th-century piece of clothing used by Kuwaiti divers searching for pearls in the Persian Gulf

Perils of Pearl Diving

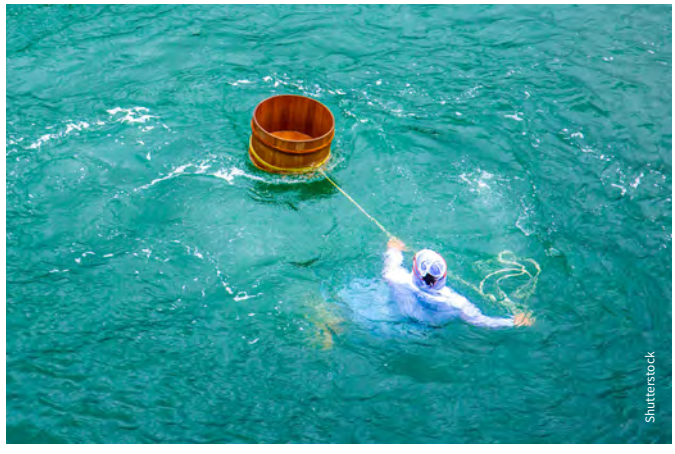
In Asia, some oyster beds could be found within two metres of water, but more often than not, divers had to descend below 30 metres on a single breath to find them. They were also exposed to the cold, currents, hostile creatures, and the dangers of drowning.

The divers had very basic tools and technology to aid them. Some greased their bodies to conserve heat, wore a clip over their noses, and clung to a rock to save energy from swimming and to descend quickly.

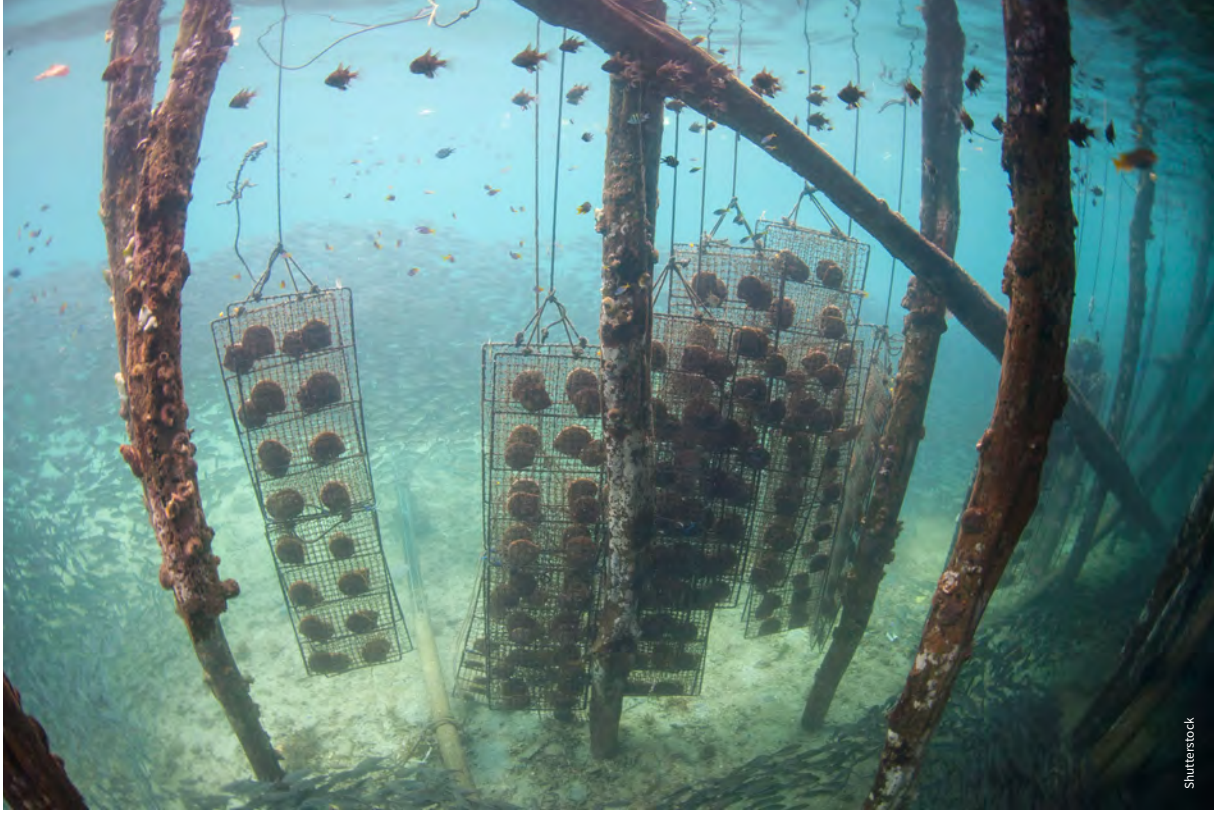
Ama Divers of Japan

Literally translated as "women of the sea", *ama* pearl divers worked in the chilly waters of Japan, wearing nothing but a loincloth till the 1960s. Records of the *ama* date back as far as 927 CE. They primarily dived for seafood and occasionally sought those elusive pearls. When the demand for the precious gems skyrocketed in the Edo period (1603–1868), the *ama* played a central role in the flourishing pearl industry. Especially when Kokichi Mikimoto started cultivating pearls in 1893, the demand for *ama* divers rose significantly.

> *Ama* divers plant and harvest the oysters around Mikimoto Pearl Island



> ∧ An oyster haul from the bottom of the Muar River, Malaysia



^ Pearl oysters hang below a pier in Alyui Bay, Raja Ampat, Indonesia

v A pearl farm in Halong Bay, Vietnam

HOW IT WORKS ON PEARL FARMS

Cultured pearls are grown in a specialised aquaculture facility where they are produced through pearl oysters or freshwater mussels. These farms are typically located in coastal areas with suitable environmental conditions for pearl-producing molluscs.

Perfect Conditions Necessary

Temperature, salinity and clarity of water play crucial roles in the health and growth of the molluscs, so farms are normally situated in coastal waters that are clean and nutrient-rich. Floating platforms, rafts or suspended lines are used to anchor the oysters or mussels.

Stimulation Required

To initiate pearl formation, a skilled technician carefully implants a nucleus, like a small bead or mantle tissue, into the soft tissues of the mollusc to stimulate the secretion of nacre, the substance that forms the pearl.

Strict Quality Control

The farmers then carefully and closely monitor the conditions to ensure optimal growth. After a specific period of time, the pearls are carefully extracted and assessed based on size, shape, colour, lustre and surface quality.

Prepared for Sale

The harvested pearls then undergo a cleaning process to remove residue, are sorted and graded based on their quality, and prepared for sale to jewellery manufacturers and retailers.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THE CIRCULAR ECONOMY OF PEARL FARMING

Pearl farmers have been doing it right this whole time! Beautiful pearls come from healthy oysters, which depend on quality sea water and the right conditions to flourish. So marine conservation efforts involve restrictions on overfishing and minimising all forms of plastic pollution in the area. Healthy coral reefs are the foundations of a delicate marine ecosystem that provide nutrients for the growth of happy oysters.

LIVE WATER FILTERS

In addition, the oysters filter water as they feed, purifying the water and creating an even more pristine marine environment. A single adult oyster can filter up to about 190 litres of water a day, removing pollutants, and excess nitrogen, minimising the growth of oxygen-sucking algae. The nitrogen absorbed goes into the shells and tissues to help the oysters grow.


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NOTHING WASTED

There is no question whether pearl farms are sustainable or not. When resources are used efficiently, pearl farms can remain economically and financially viable. Marine pearl oysters can be nucleated up to three times, so one oyster can produce multiple pearls in its lifetime. Mother-of-pearl from oyster shells can then be extracted for the watch and jewellery industries, the shells can be fashioned into buttons, and pharmaceutical companies use the calcium carbonate content as food supplements. Some pearl farms use mother-of-pearl to produce bead nuclei for pearl cultivation, and this practice has consistently produced quality pearls. In addition, the oyster or mussel is a nutritious source of food: The inner tissues are used in composting, which in turn is used to fertilise the soil for agriculture.

LUCRATIVE ALTERNATIVE TO FISHING

Pearl farms create varied employment opportunities for local communities, from working on the farm to the business's various components, such as shipping, logistics, trade, business development, tourism and fashion.

"When resources are used efficiently, pearl farms can remain economically and financially viable."

< In the Middle East, rows of floats help to anchor the oyster cages

< v Tahitian pearl diver checking on the oysters

v Cultured pearls are sorted according to size, colour shape and lustre

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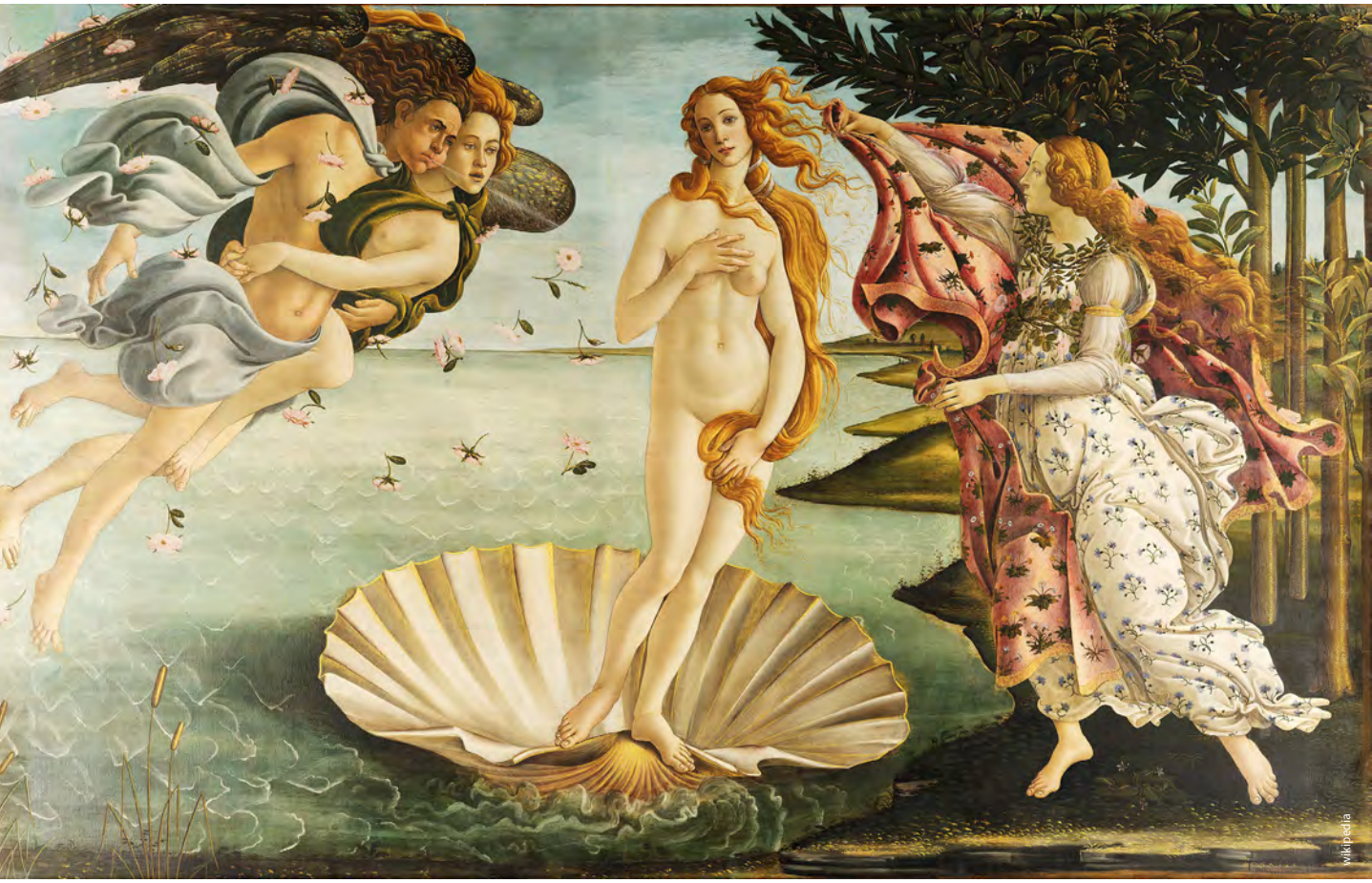


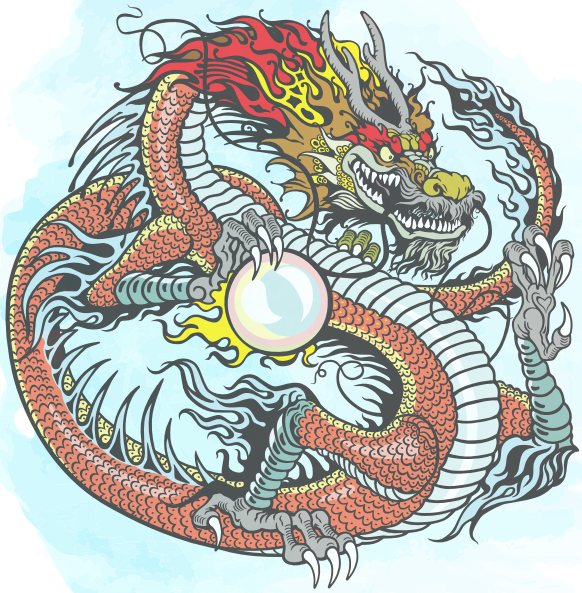
LEGENDS OF PEARLS

Before the advent of cultured pearls, the Persian Gulf – with its abundance of oyster beds – was the centre of the pearl trade. Pearls were also their source of wealth long before the discovery of oil. Arab legends say pearls were formed from the tears of the gods, swallowed by oysters when they fell into the sea.

The Romans believed Venus emerged from an oyster shell, and any drop of water from her body became a pearl. Famous Italian Renaissance painter, Sandro Botticelli, depicted this in the early 1480s.

In the Dark Ages, between the 5th and 14th centuries, knights wore pearls on the battlefield, believing they would be protected from harm.

Cleopatra once crushed a pearl into a glass of wine to prove she could throw the most lavish, expensive dinner in history.



^
A Chinese dragon holding a pearl

One Chinese myth says pearls fell out of the sky as dragons fought amongst the clouds. Another Chinese legend tells of a boy who found a pearl in a field, brought it home and hid it in his rice pot from marauders who came to his village. The pot started overflowing with rice from this miraculous pearl. When his neighbours became jealous and tried to steal it, he quickly swallowed it and turned into a dragon. AD

<
The Birth of Venus (c. 1484–1486), Sandro Botticelli

v
Roman painter, Andrea Casali, depicts Cleopatra, Queen of Egypt, about to crush a pearl into a wine goblet

FUN FACTS

Of the 200 known gems in the world, the pearl is the only one made by a living creature

The largest pearl in the world is the Giga Pearl, which weighs in at over 27kg with a longest dimension of almost 40cm. As a non-nacreous pearl, it is composed of calcite rather than nacre. It is GIA certified and came from a giant clam (*Tridacna gigas*) in the Philippines, and worth upwards of USD90 million. As the largest bivalve, these clams can grow up to 1.3 metres wide and weigh about 250kg. The pearl is currently paired with a 22-carat gold-leaf octopus by sculptor, Bethany Krull.

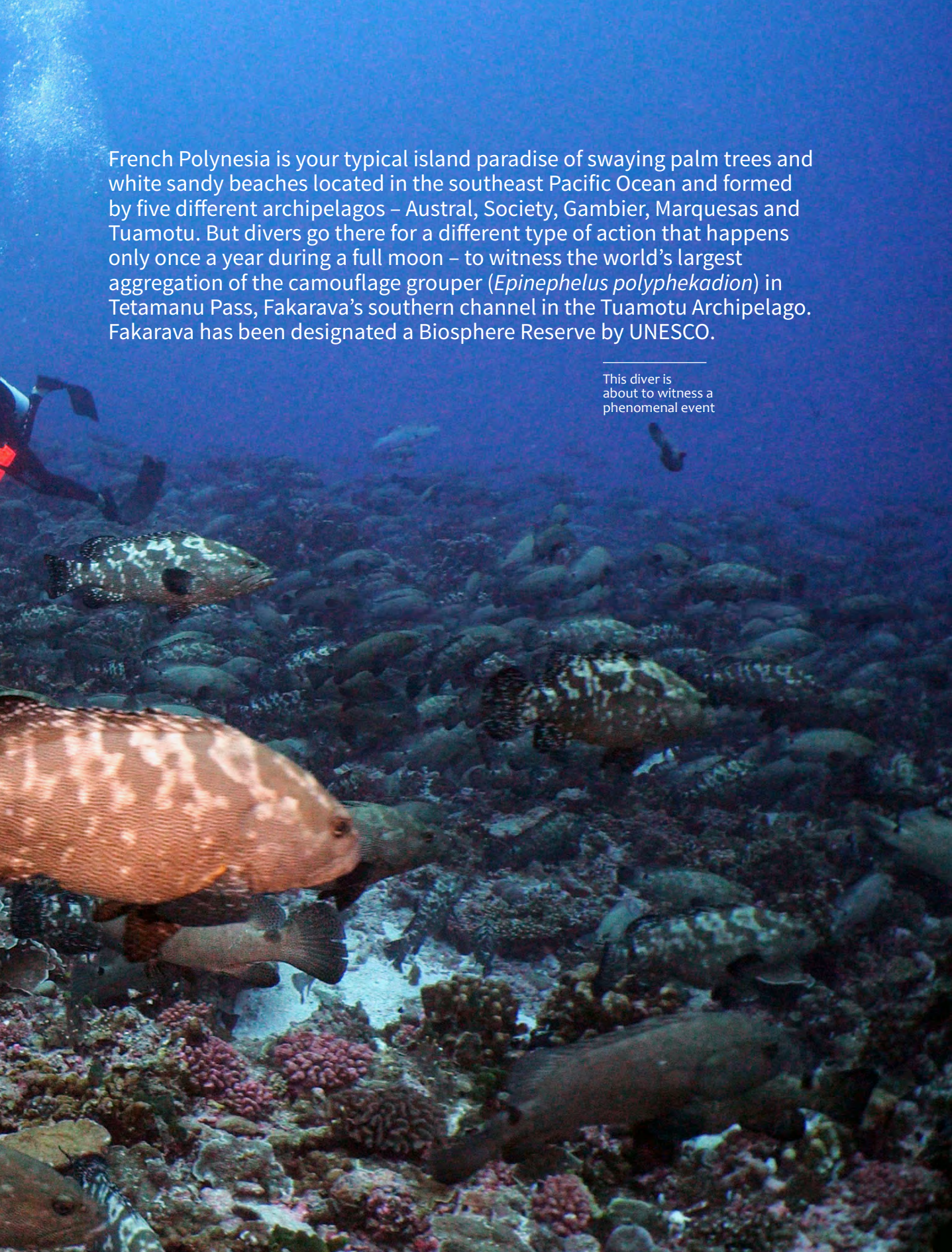
THE WORLD'S LARGEST
CAMOUFLAGE GROUPER SPAWNING

Full Moon Party

Text and Images by **ALFONSO RIBOTE**

Aaron Wong

French Polynesia is your typical island paradise of swaying palm trees and white sandy beaches located in the southeast Pacific Ocean and formed by five different archipelagos – Austral, Society, Gambier, Marquesas and Tuamotu. But divers go there for a different type of action that happens only once a year during a full moon – to witness the world's largest aggregation of the camouflage grouper (*Epinephelus polyphekadion*) in Tetamanu Pass, Fakarava's southern channel in the Tuamotu Archipelago. Fakarava has been designated a Biosphere Reserve by UNESCO.



This diver is about to witness a phenomenal event

"As the males change colour to a very light green, and the females have selected their mates, they rise from the bottom together, cheek-to-cheek, and release their load into the water."

AN ANNUAL AFFAIR

Between the end of June and the beginning of July, these groupers gather in phenomenal numbers in the channel, waiting for the right time to spawn. Scientists have estimated the aggregation to be between 15,000 and 18,000 individuals. The fish gather at the mouth of the channel and wait at the bottom.

WAITING FOR THE RIGHT MOMENT

As the spawning day draws closer, the number of groupers increases so dramatically that they literally cover the entire bottom of the channel. The bellies of the females grow significantly to hold the eggs they will release into the water, and the territorial males fight for the most ideal positions, closest to the most fecund females, who look like they are about to explode.

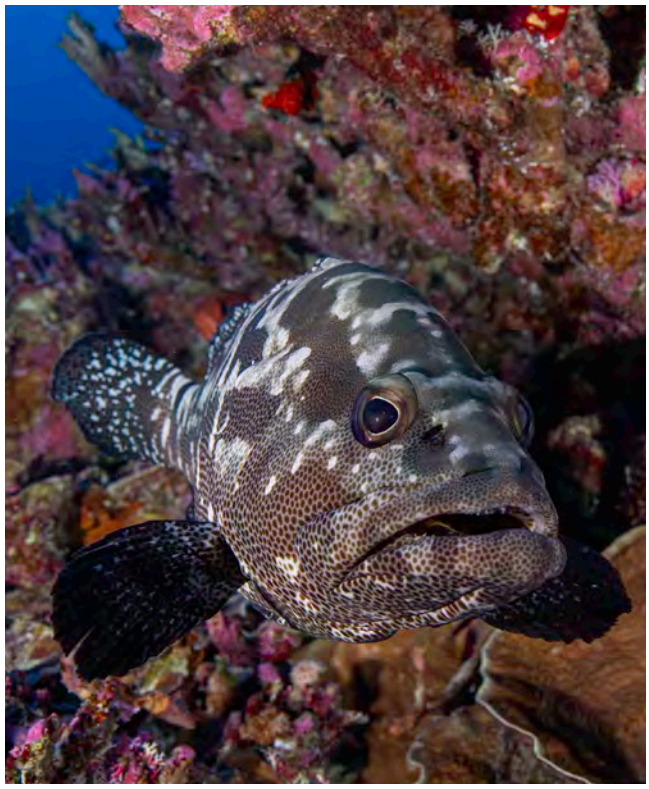
FISHY ORGY

The right moment happens very early in the morning during the strong outgoing currents of the full moon. As the males change colour to a very light green, and the females have selected their mates, they rise from the bottom together, cheek-to-cheek, and release their load into the water. Many opportunistic males quickly follow after to join the party, creating a white haze of messy love scenes! The fertilised eggs are then carried by the currents, and are at the mercy of the open ocean.

FISH BUFFET

Tetamanu Pass is also known for having the highest population of grey reef sharks in the world – and the number blows up to an estimated 700 sharks during the grouper spawning. Other shark species like oceanic blacktips, lemons,

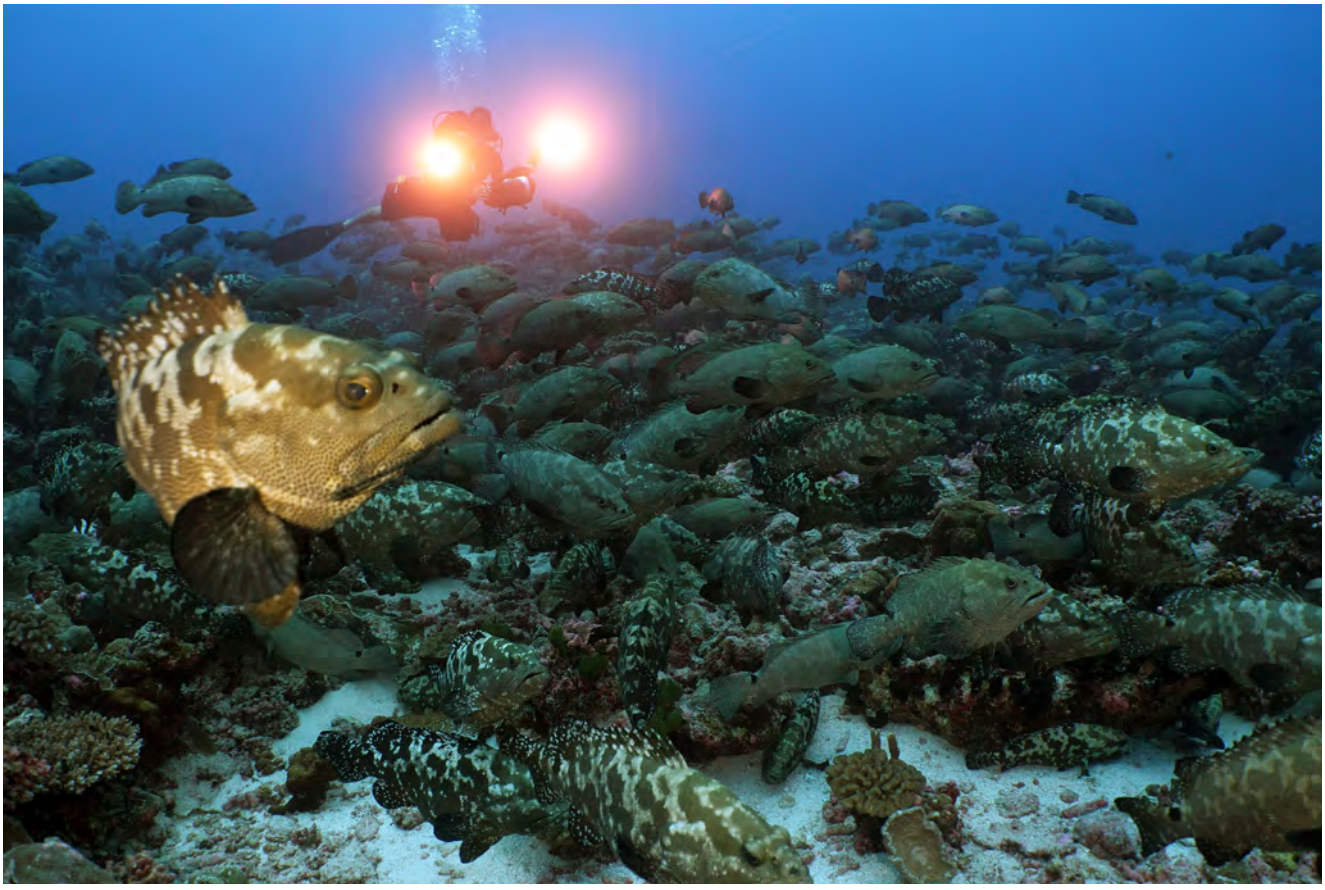
silvertips and whitetip reef sharks are also present, though in much smaller numbers. They are the main predators of the groupers during the spawning. The sharks take advantage of this moment to have a good meal, as the groupers are more vulnerable – away from the shelter of the reef and solely focused on spawning their future offspring. Other groups of predators waiting for their chance to feed are the smaller fishes, which try and eat as many eggs as possible before they are swept out by the currents.

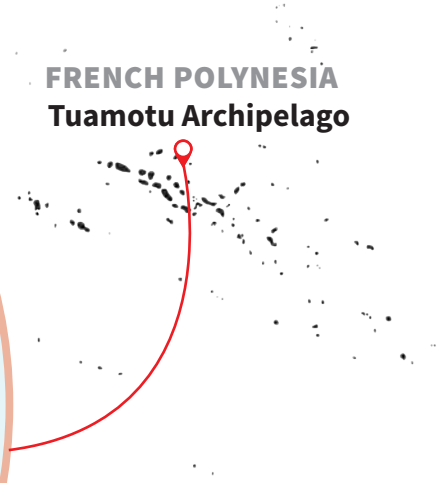


< Males and females look for the right partner to spawn

v Once the partners are chosen, they slowly rise from the seabed together

> The grouper has to stray from the safety of the reef to spawn





v
Groupers patiently wait for the right moment

"You can also find them in the western Pacific, from southern Japan to southern Queensland in Australia's Great Barrier Reef. You normally can find them at depths of one to 60 metres."

LIFE CYCLE

When the fertilised eggs that make it to the open ocean hatch, the baby groupers grow very quickly to a certain size before returning to the reef to start the whole cycle again.

A COMMON SIGHT

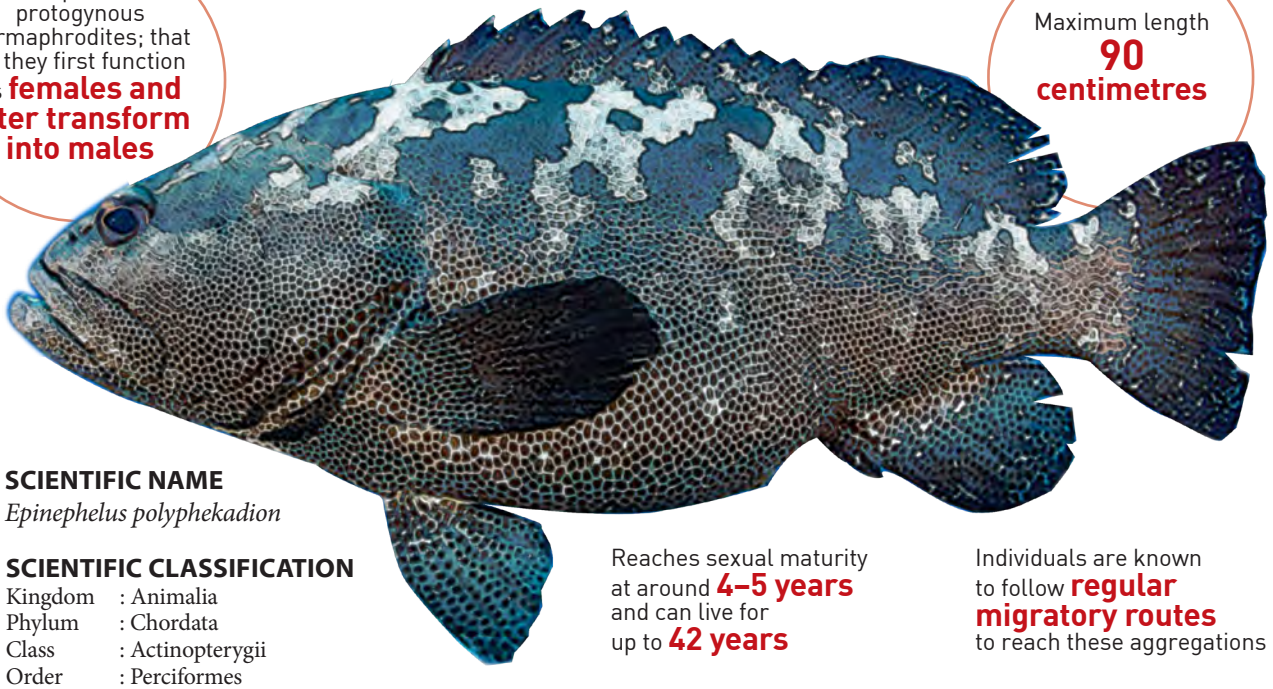
The species is distributed in the Indo-Pacific, from the Red Sea, along East Africa, south to Mozambique, and east of French Polynesia. You can also find them in the western Pacific, from southern Japan to southern Queensland in Australia's Great Barrier Reef. You can normally find them at depths of one to 60 metres. This species is only found in big numbers during its reproductive season when they migrate to the spawning areas. Its life span is about 30 years and it reaches sexual maturity at around four to five years. AD

CAMOUFLAGE GROUPER

The camouflage grouper (Epinephelus polyphekadion), also known as the blue-tailed cod, camouflage rockcod, small-toothed rockcod, smooth flowery rock-cod, snout-spot grouper or snout-spot rock-cod. It is a species of marine ray-finned fish from the subfamily Epinephelinae and part of the family Serranidae, which also includes the Anthias and the sea basses. It has a wide Indo-Pacific distribution residing among the reefs.

Groupers are protogynous hermaphrodites; that is, they first function as **females and later transform into males**

Maximum length **90 centimetres**



SCIENTIFIC NAME

Epinephelus polyphekadion

SCIENTIFIC CLASSIFICATION

Kingdom	: Animalia
Phylum	: Chordata
Class	: Actinopterygii
Order	: Perciformes
Family	: Serranidae
Subfamily	: Epinephelinae
Genus	: *Epinephelus*
Species	: *E. polyphekadion*

Reaches sexual maturity at around **4–5 years** and can live for up to **42 years**

Individuals are known to follow **regular migratory routes** to reach these aggregations

Depth found **one to 60 metres**

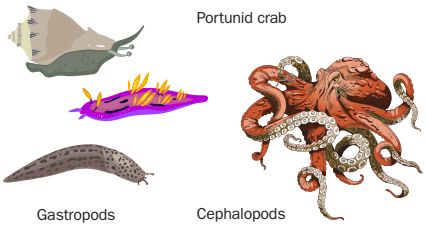
CONSERVATION STATUS

EX EW CR EN VU NT LC

Extinct — Threatened — Least Concern

Area of distribution

Portunid crab



Gastropods — Cephalopods

HABITAT AND BIOLOGY

Often found in coral-rich areas of lagoons and outer reefs, and in caves and large crevices. Most abundant around islands, particularly atolls. Usually in small schools but may be solitary. **Feeds mainly on crustaceans (portunid crabs) and fishes, sometimes on cephalopods and gastropods.**

MARKET VALUE

In the past, the camouflage grouper was common in the fish markets of Zanzibar. Almost all fish caught are fished from spawning aggregations. The major exporting nations are the Philippines and Indonesia. There is also an important commercial fishery in the southern part of the Red Sea coast of Saudi Arabia. They have been produced in hatcheries, but this has not yet proven to be commercially sustainable.

DON'T JUST LOOK AT A SHARK, DIVE WITH ONE

By training divers to dive safely with sharks, Shark Education aims to create a legion of shark ambassadors that understand why these apex predators are worth so much more alive than dead

Text by **MARGAUX LE BRUN** and **STEVEN SURINA**

Millions of sharks are culled for the still-lucrative fin trade

Shark Education

TRAIN TO DIVE WITH SHARKS

Shark Education is a dive company that trains divers to dive with sharks, in the form of seminars where they teach the factors that influence an encounter, and how to interpret shark behaviour. The knowledge and experience acquired contribute to the right conduct and approach for future encounters with sharks. They have been offering this training in 26 destinations with 32 shark species since 2011.

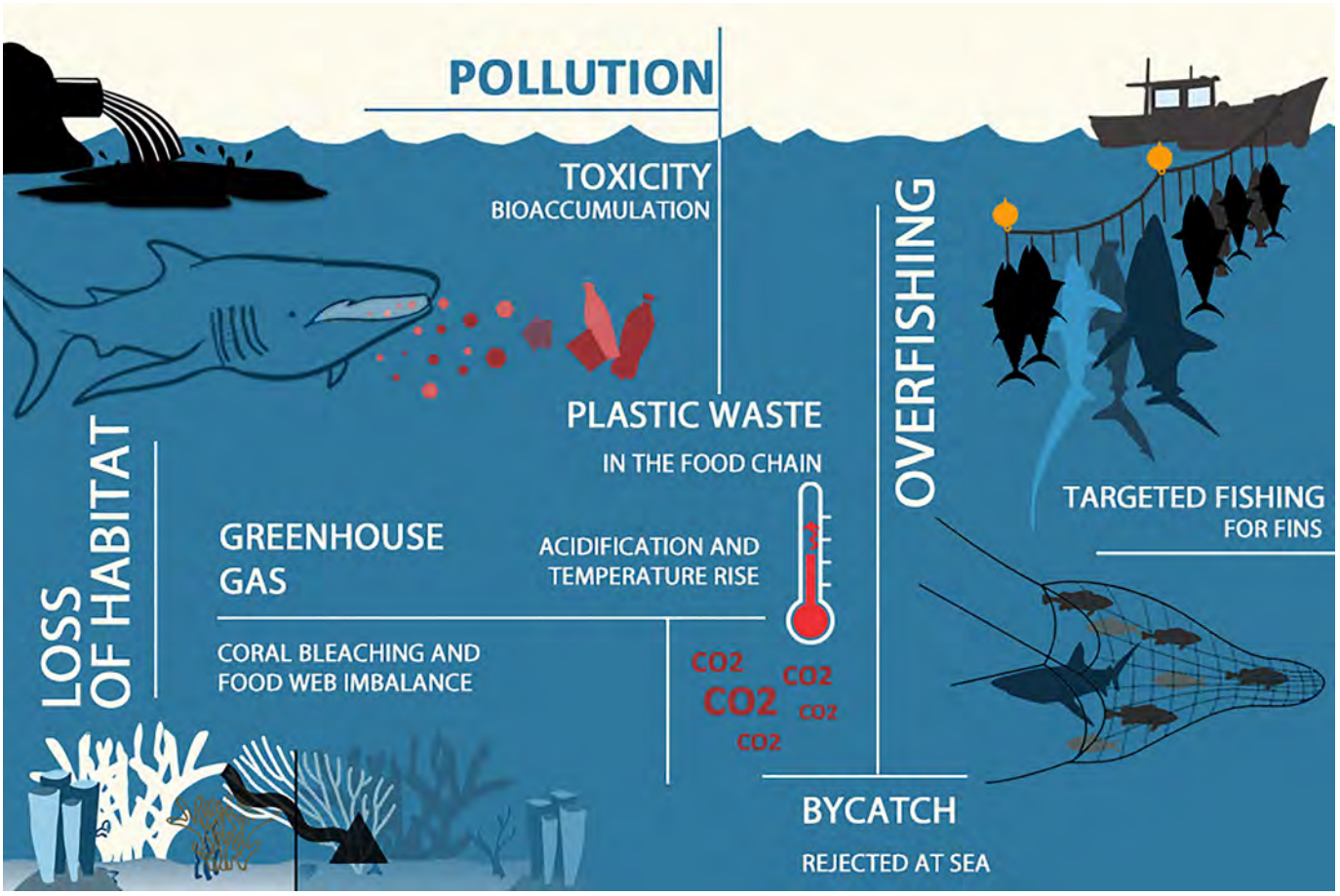
SPREAD THE MESSAGE THROUGH EDUCATION AND INTERACTION

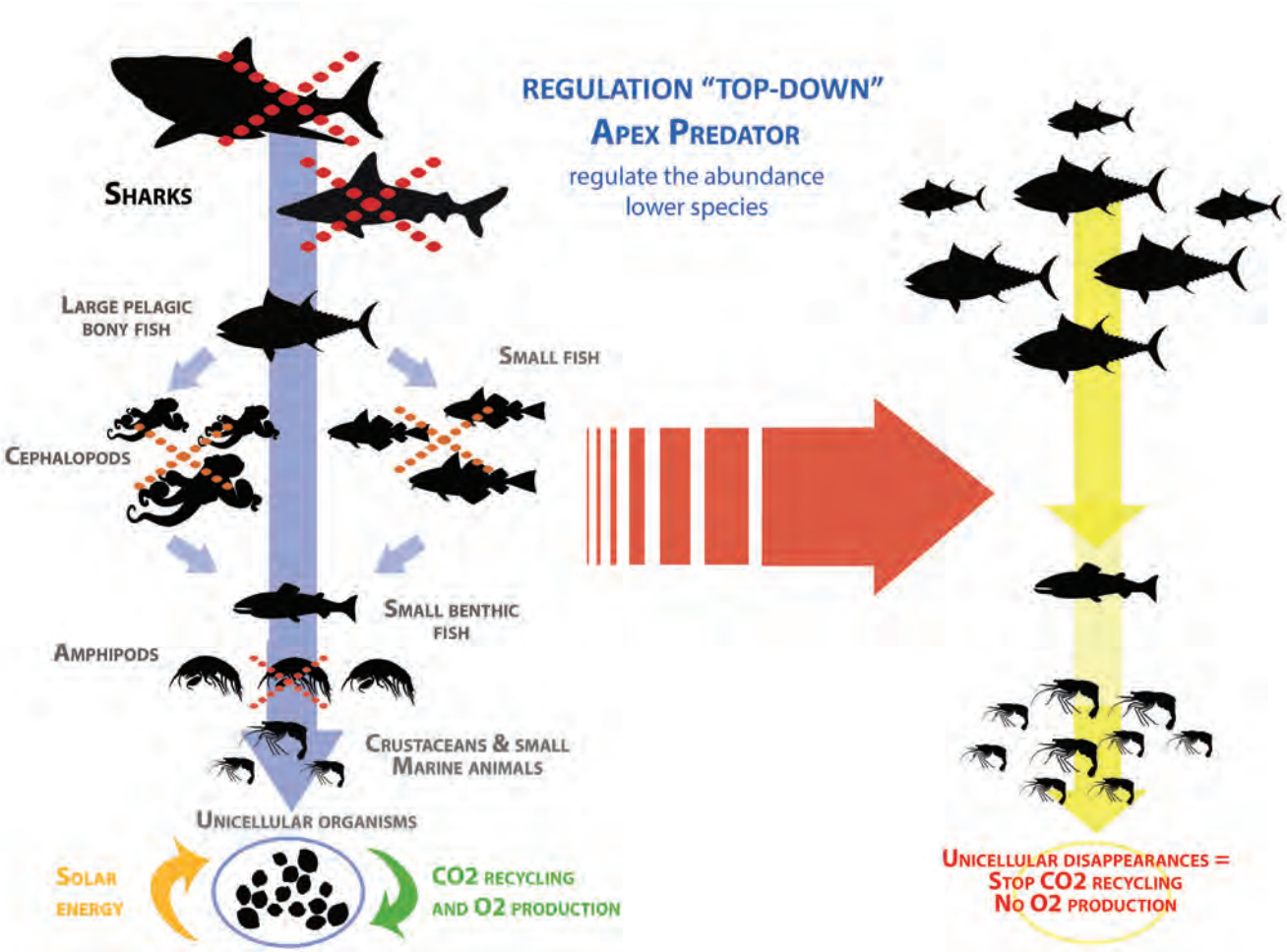
By realising that it is possible to interact with sharks, participants will discover a new perspective. The psychological effect that emerges after experiencing a privileged moment not only encourages and leads divers to advocate for shark protection, but will also make them informed ambassadors and advocates who can pass on the message.

DESTINED TO DISAPPEAR

Whether it's climate change, the loss of over 50 percent of the planet's vertebrates or the melting of the permafrost, we're all becoming increasingly aware of the importance of preserving biodiversity. Sharks are symbolic of this unconscious devastation, as they are destined to disappear over the next 150 years.

v
The ocean and its inhabitants face multiple threats





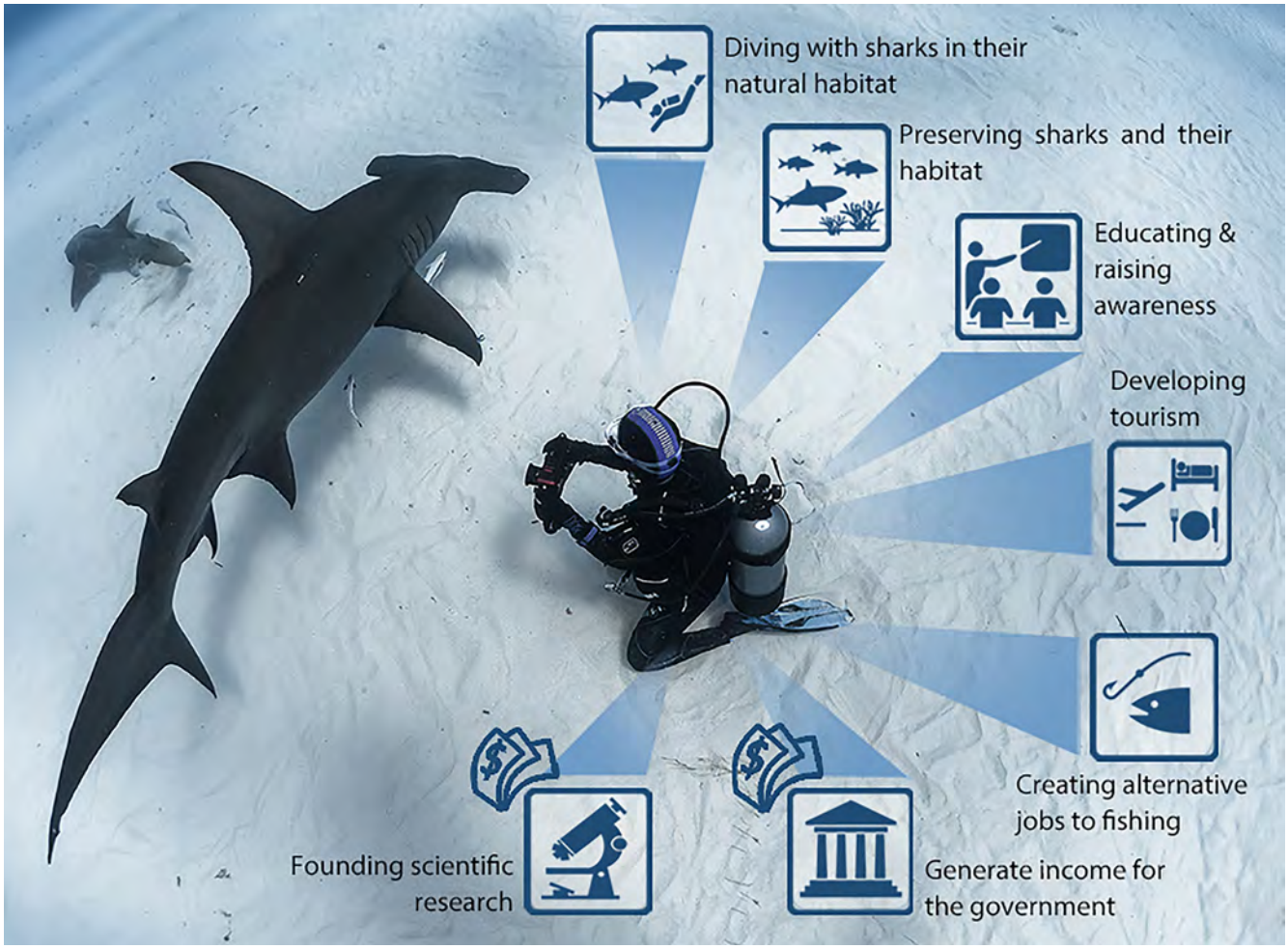
THE OCEANS' VERITABLE GUARDIANS

Sharks have been fished relentlessly since the middle of the 20th century, and 90 percent of the major shark families have already disappeared. At the top of the food chain of all marine ecosystems, sharks are keystone species that regulate the proliferation of lower-ranking fish and sick animals. They are the oceans' veritable guardians, and ultimately, indicators of ocean health.

WHEN THERE ARE NO MORE SHARKS...

The removal of sharks will disrupt the global marine food chain to the point of impacting the production of breathable oxygen for humans, and halting the regulation of carbon dioxide, which is responsible, in part, for the melting of the ice caps.

^ When sharks are eliminated from the food chain, a catastrophe results



^ Sharks are worth more alive than dead

THE TRUE ECONOMIC VALUE OF SHARKS

Sharks have an economic value for the entire fishing industry – from the fisherman to your local fishmonger. However, this value has diminished because of the overall decline in shark catches. On the other hand, shark ecotourism has become a profitable and sustainable economic activity, generating millions of dollars in revenue and creating thousands of direct and indirect jobs. Sharks also have a cultural and heritage value for certain ethnic groups, especially those who have strong ties with the sea.

Similar economic studies have been carried out, clearly demonstrating that animals, particularly sharks, are worth more alive than dead. Although income from fishing is still higher than from ecotourism, the projected growth rate for ecotourism is very high, about 50 percent over the next 20 years.

CURRENT SHARK CRAZE

Whatever the reason, there's an undeniable craze for shark ecotourism now. And everyone is getting involved. Authorities are increasingly interested in capitalising on, and regulating, this growing economic activity. Scientists are also monitoring the phenomenon to provide authorities with decision-making elements for regulating these activities, and at the same time, preserving environments and conserving the species.

Shark Education

"Sharks also have a cultural and heritage value for certain ethnic groups, especially those who have strong ties with the sea."

The results of shark ecotourism have led to the creation of sanctuaries, marine reserves and parks that protect the sharks. To date, no other protection effort has been so effective.

CURRENT PROJECTS

Shark Education has set up a citizen science project in the Azores, Portugal, which will run from July through September 2024, to study the populations of blue sharks, the world's most heavily-fished shark species. They will bring groups of certified divers to dive with sharks, who will help to collect data by photo-identifying, laser-measuring and counting the individuals observed.

^ Fishermen cutting off fins to sell at a high price

< Steven Surina and Margaux Le Brun from Shark Education

The data will then be passed on to a local scientist for processing and analysis.

They are also working on publishing a book on human and shark interaction in English. You can follow their progress on Instagram *@shark_education_official,* and on Facebook. AD

Marconi penguins walk confidently past two king penguins, Macquarie Island, Australia

UNESCO MARINE WORLD HERITAGE SITES

BEACONS OF HOPE FOR THE PLANET

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The 1972 World Heritage Convention was founded on the premise that certain places on Earth have outstanding universal value and, as such, should form part of the common heritage of humankind. On a planet that is over 70 percent ocean, a huge amount of that heritage is located in marine areas. These sites are recognised for their exceptional natural phenomena, their geological processes, ecological functions and outstanding biodiversity found nowhere else on the planet.

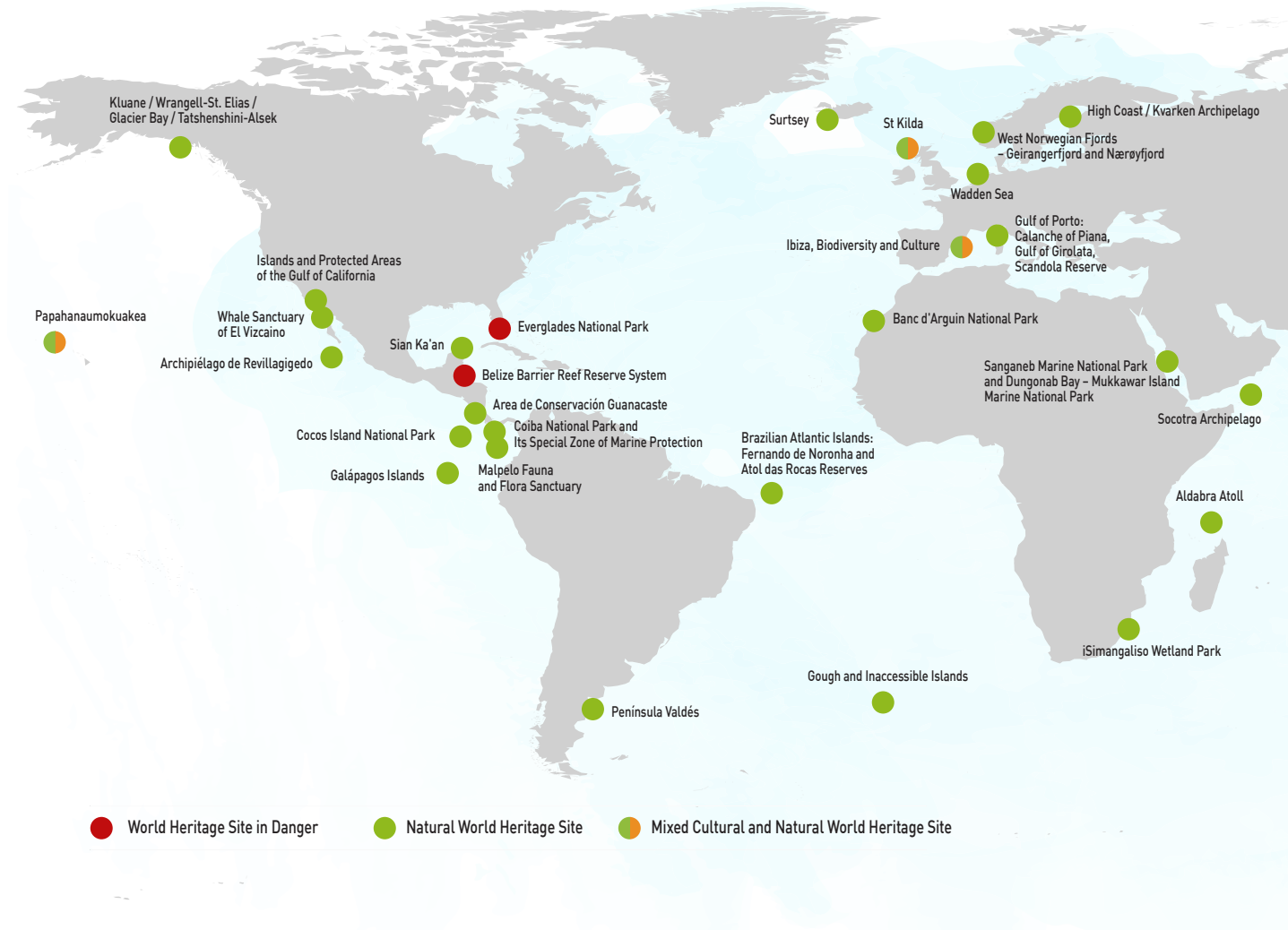
A RIGOROUS SELECTION PROCESS

The process for inscribing the sites is rigorous and takes years of nominations and evaluations. A World Heritage Site is judged for its exceptional natural beauty, its significant geomorphic or physiographic features, and in-situ conservation of biodiversity that includes threatened species considered for their outstanding universal value in science or conservation.

Today, 50 sites across 37 countries have been inscribed on the World Heritage List specifically in recognition of their exceptional marine values, and 21 of them are in Asia, the Pacific, and the Indian Ocean!

50 MARINE SITES

inscribed on the World Heritage List



^
The Great Barrier Reef off Queensland, Australia

AUSTRALIA

Great Barrier Reef (GBR) 1981

Located in the Coral Sea off the coast of Queensland, this is the world's largest coral reef system, and largest living structure on Earth. Designated a World Heritage Site in 1981, the reef spans an area of about 340,000 square kilometres, consists of thousands of individual coral reefs and islands, and is renowned for its biodiversity. The various threats it faces include climate change, pollution and overfishing, and efforts are underway to protect, conserve and ensure its survival.

"Located in the Coral Sea off the coast of Queensland, this is the world's largest coral reef system and largest living structure on Earth."

> Dugongs spotted at Shark Bay, Western Australia

> v The remote subantarctic Heard Islands are a pristine wilderness

Shark Bay, Western Australia, 1991

Lying at the most westerly point of the Australian continent, Shark Bay and its islands were chosen as a World Heritage Site for three reasons: firstly, for its seagrass beds, which are the largest in the world; secondly, for its dugong population; and lastly, for its stromatolites – colonies of algae which form hard, dome-shaped deposits and are among the oldest forms of life on Earth.

Heard and McDonald Islands, 1997

These subantarctic islands that form the external territory of Australia lie in the southern Indian Ocean, southwest of Perth. Heard Island was discovered in 1833 by a British sealing vessel, where colonies of elephant seals and penguins were exploited by hunters. The island was later named after an American mariner, Captain John Heard. Since the early 20th century, however, the island was pretty much left alone, and it has since reverted to a pristine subantarctic wilderness, largely inhabited by scientific research parties. Heard Island, together with McDonald Islands – a nearby group of uninhabited rocky islets – were designated a UNESCO World Heritage Site in 1997.

Macquarie Island, 1997

Lying southeast of Tasmania, Macquarie Island is recognised as the only place in the world where rocks from Earth's mantle are exposed above sea level as a result of geologic activity. The island experiences earthquakes about once a year because it is right where the Pacific and Indian-Australian Plates meet.

Ningaloo Coast, 2011

Situated on the remote, western coast of Australia, Ningaloo Coast has one of the longest near-shore reefs in the world. Whale sharks gather annually among numerous marine species and a wealth of turtles. It also features an extensive karst system and a substantial network of underground caves, subterranean waterbodies and underground streams.

> Turtle hatchlings on the beach, Ningaloo National Park

> ^ King penguins, *Aptenodytes patagonicus,* on Macquarie Island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BANGLADESH

The Sundarbans, 1997

Situated on the Ganges Delta, straddling Bangladesh and the Indian state of West Bengal, the Sundarbans is divided into two complementary World Heritage Sites: India's Sundarbans National Park and the Bangladeshi portion, simply called "The Sundarbans". The site is a complex network of tidal waterways, mudflats and mangrove forest – the largest in the world. The area is known for its wide range of fauna, including birds, Bengal tigers and threatened species like the estuarine crocodile and Indian python.

Shutterstock

< An estuarine crocodile alongside the mangroves in the Sundarbans

Shutterstock

< Bengal tigers are found in both the Indian and Bangladeshi parts of the Sundarbans

INDIA

Sundarbans National Park, 1987

The Indian portion of the Sundarbans mangrove area in the delta formed by the Ganges, Brahmaputra and Meghna Rivers – known as Sundarbans National Park – is one of the most biologically productive of all natural ecosystems. This habitat of forests and waterways supports a wide range of fauna, including rare and endangered species of aquatic mammals, birds and reptiles, as well as the largest population of tigers in the world.

<

A Komodo dragon (*Varanus komodoensis*) at Komodo National Park

INDONESIA

Komodo National Park, 1991

Located in the centre of the Indonesian archipelago, Komodo National Park encompasses Komodo, Padar and Rinca, as well as 26 smaller islands. The landscape is significantly different from the lush, western islands of Indonesia because it lies along the Wallace Line, on the cusp of the Australian and Sunda ecosystems. The park has been identified as a global conservation priority area containing unparalleled terrestrial and marine ecosystems, and inhabited by a population of Komodo dragons – the world's largest living lizards – that exist nowhere else on the planet. The rich coral reefs around Komodo host a great diversity of species, and the strong currents attract turtles, whales, dolphins and dugongs.

Ujung Kulon National Park, 1991

Situated in the extreme southwestern tip of the highly-populated island of Java on the Sunda shelf, the Ujung Kulon peninsula became a repository for the island's important flora and fauna as a result of the eruption of the Krakatoa volcano in 1883, which removed the villages and crops in the coastal areas.The area is globally significant as the last and most important habitat of the critically endangered Javan rhino (*Rhinoceros sondaicus*).

v

Around 75 Javan rhinos are thought to inhabit Ujong Kulon, the last known refuge for this critically endangered species

> Japan's Ogasawara Islands, viewed from Mount Chibusa on Hahajima

JAPAN

Ogasawara Islands, 2011

The archipelago comprising more than 30 islands in the northwestern Pacific Ocean is home to a wealth of fauna, including the critically endangered Bonin flying fox. The landscape is dominated by subtropical forests and shrublands surrounded by steep cliffs. The islands are an outstanding example of the ongoing evolutionary processes in oceanic island ecosystems, evidenced by its high levels of endemism. Only two of the islands are inhabited, Chichijima and Hahajima.

"The site is globally important for threatened seabirds, migratory birds, salmonid species, Steller's sea lion and certain cetaceans."

Shiretoko, 2005

The peninsula is located in the northeast of Hokkaido, Japan's northernmost island, and is one of the richest integrated ecosystems in the world. The supply of nutrient-rich water resulting from the formation of sea ice in the Sea of Okhotsk allows successive blooms of phytoplankton in early spring, which underpins Shiretoko's marine ecosystem, attracting a huge variety of animals. The site is globally important for threatened seabirds, migratory birds, salmonid species, the Steller's sea lion and certain cetaceans.

v Steller's sea eagles in winter, Shiretoko Peninsula

KIRIBATI

Phoenix Islands Protected Area (PIPA), 2010

This property is the largest designated marine protected area in the world, conserving one of the largest, intact oceanic coral archipelago ecosystems, which include 14 known seamounts and other deep-sea habitats. This oceanic wilderness illustrates the pristine environment as a migration route and reservoir for 800 species of fauna, including over 500 species of fish, 18 marine mammals and 44 bird species. Due to its isolation, the area is ideal as a critical pitstop and habitat for migratory and pelagic species, compared with other island systems where human habitation and exploitation have significantly altered the environment.

^ Coral reefs near Enderbury Island, Phoenix Islands Protected Area (PIPA)

v A hawksbill sea turtle cruises over the reef in the Rock Islands Southern Lagoon

PALAU

Rock Islands Southern Lagoon, 2012

The lagoon encompasses 445 uninhabited mushroom-shaped, limestone islands surrounded by coral reefs. They sustain a large diversity of plants, birds and marine life, including at least 13 species of sharks and dugongs. The site has a high concentration of marine lakes, isolated bodies of seawater separated from the ocean by land barriers. In 2009, the island made history by establishing the world's first shark sanctuary, a bold step towards global shark conservation.

^
A polar bear at Wrangel Island Nature Reserve

RUSSIAN FEDERATION

Natural System of Wrangel Island Reserve, 2004

Consisting of Wrangel Island and Herald Island, and located well above the Arctic Circle, the reserve is a self-contained island ecosystem that has undergone a long evolutionary process uninterrupted by glaciation that swept most parts of the Arctic during the Quartenary period (beginning 2.6 million years ago and extending to the present day). The area boasts the world's largest population of Pacific walruses and the highest density of ancestral polar bear dens. It is also the major feeding ground for grey whales migrating from Mexico and the northernmost nesting ground for over 100 migratory bird species.

v
Aldabra Atoll's famed reptilian residents

SEYCHELLES

Aldabra Atoll, 1982

Located in the Indian Ocean, the Aldabra Atoll is an outstanding example of a raised coral atoll. Due to its remoteness and inaccessibility, the atoll has remained largely untouched by humans for the majority of its existence. It is also one of the largest atolls in the world, and contains one of the most important natural habitats for studying evolutionary and ecological processes. Famously, it is also home to the world's largest population of giant tortoises.

PHILIPPINES

Puerto-Princesa Subterranean River National Park, 2012

Located in the southwestern part of the Philippines on the island of Palawan, the park features a spectacular limestone karst landscape with more than eight kilometres of underground river, which flows directly into the sea. This mountain-to-sea ecosystem provides significant habitats for biodiversity conservation.

> This lagoon is the beginning of the longest navigable underground river in the world

v Beautiful corals abound in Tubbataha Reefs Natural Park

Tubbataha Reefs Natural Park, 1993

Its unique position in the Sulu Sea bears high-quality marine habitats that provide sanctuary for whales, dolphins, sharks, turtles and many other marine animals. The park, which encompasses the Tubbataha and Jessie Beazley Reefs, supports over 360 species of corals and over 700 species of fish. The reserve also protects the few remaining colonies of breeding seabirds in the region.

SOLOMON ISLANDS

East Rennell, 1998

The largest raised coral atoll in the world, Rennell Island is dominated by Lake Tegano, the atoll's 15,000-hectare former lagoon. East Rennell makes up the southern third of the island. The many rugged limestone islets in the lake's brackish waters harbour numerous endemic species, including sea snakes, and the surrounding karst terrain has indigenous forest cover.

v
Rennell, the southernmost island in the Solomon Islands, is the world's largest raised coral atoll

v
v
A silver-capped fruit dove (*Ptilinopus richardsii*) perched on a branch in the forest canopy on Rennell Island

UNESCO / Adam Stewart Hogg

Shutterstock

VIETNAM

Ha Long Bay – Cat Ba Archipelago, 1994

The bay forms a spectacular seascape with some 1,600 limestone islands and towering limestone pillars rising from the sea in the Gulf of Tonkin. Seven types of ecosystems are found here and the area is home to threatened, endemic species like the Cat Ba langur, the Cat Ba tiger gecko, and the Asian small-clawed otter.

v
Cat Ba Archipelago, which makes up the southeastern edge of Lan Ha Bay

"Seven types of ecosystems are found here and the area is home to threatened, endemic species like the Cat Ba langur, the Cat Ba tiger gecko, and the Asian small-clawed otter."

The other marine World Heritage Sites around the world are:

1978
Ecuador
Galápagos Islands

1979
Canada
USA
Kluane Wrangell-St. Elias Galcier Bay Tatshenshini-Alsek

1983
France
Gulf of Porto: Calanche of Piana, Gulf of Girolata, Scandola Reserve

1986
United Kingdom
St Kilda

1995
United Kingdom
Gough and Inaccessible Islands

1996
Costa Rica
Area de Conservación Guanacaste

1997
Costa Rica
Cocos Island National Park

^ *Adenium obesum* subsp. *socotranum* is native to Socotra Island, which is part of the Socotra Archipelago

YEMEN

Socotra Archipelago, 2008

The archipelago is found in the northwestern part of the Indian Ocean near the Gulf of Aden. Comprising four islands and two rocky islets, the site is of universal importance because of its biodiversity and endemism of the flora and fauna. The area also supports significant populations of land and seabirds, and diverse marine life, including reef-building corals, fish and crustaceans. As one of the most isolated landforms on Earth, Socotra is home to more than 700 endemic species of plants and animals. The most striking is the dragon's blood tree, *Dracaena cinnabari*. This strange, umbrella-shaped tree gets its common name from the red sap it produces. AD

1999
Spain
Ibiza, Biodiversity and Culture
South Africa
iSimangaliso Wetland Park

2000
Finland
Sweden
High Coast Kvarken Archipelago

2005
Panama
Coiba National Park and Its Special Zone of Marine Protection

2006
Colombia
Malpelo Fauna and Flora Sanctuary

2008
France
Gulf of Porto: Calanche of Piana, Gulf of Girolata, Scandola Reserve
Iceland
Surtsey

2009
Germany
Netherlands
The Wadden Sea

2010
USA
Papahanaumokuakea

VERDE ISLAND PASSAGE

The Epicentre of Marine Biodiversity

Dubbed the "Amazon of the Oceans", this biodiversity hotspot and essential shipping route in the heart of the Coral Triangle is one of the most productive in the world – economically, and beneath the waves.

Images by **Tofer Morales**

This strait in the Philippines separates the islands of Luzon and Mindanao, and connects the South China Sea with the Tayabas Bay and Sibuyan Sea. It spans the five provinces of Batangas, Occidental Mindoro, Oriental Mindoro, Marinduque, and Romblon. It has been touted as the "centre of the centre" of marine biodiversity, first by Dr Kent Carpenter, IUCN Global Marine Species Assessment coordinator in 2005, and again by Dr Terry Gosliner, Dean of Science Research Collections at the California Academy of Sciences in 2015. It is also one of the country's busiest sea lanes, acting as a corridor from the Port of Manila to the Visayas and Mindanao.

<
The abundance and biodiversity of the reefs in the Verde Island Passage are astounding!

^
The jumping-off point for diving the Verde Island Passage is Puerto Galera, itself a diving haven

PROTECTING THIS VERY IMPORTANT PASSAGE (VIP)

This 1.14-hectare passageway is extremely richly biodiverse and continues to yield new species to science. Various conservation groups and government units are pushing for its nomination as a UNESCO World Heritage Site to help protect and conserve the 54 marine-protected areas in and along the passage.

Many threatened species like hawksbill turtles, olive ridley turtles, green turtles, humphead wrasses, giant groupers, giant clams, especially the redfin wrasse (*Cirrhilabrus rubripinnis*) thrive in the area. The area has recorded over 500 species of corals – one of the largest concentrations of corals in the country, and possibly the world, and the waters teem with over 1,700 species of fish.

THREATS TO MARINE BIODIVERSITY

The passage is the meandering backbone of the local economy – as a major shipping route, and as a source of food and income for the local and coastal communities taking advantage of its abundant, yet fragile, marine resources. But it is also threatened by illegal and destructive fishing practices, commercial vessels and ferries plying the routes daily, ships discharging waste and other pollutants, and growing tourism, among others.

Damselfish are among the countless reef fish that call the Verde Island Passage home

The Pikachu nudibranch (*Thecacera pacifica*) is just one of the many species of sea slugs found in the Verde Island Passage

Huge gorgonian fans face the current to filter plankton for food

DIVING THE VERDE ISLAND PASSAGE
Divers can find a bit of everything beneath the surface, from the tiniest critters to the mightiest of fish.

Batangas and Mabini

A marine-protected sanctuary, Anilao is one of the best spots for macro photography. Divers will find all manner of nudibranchs, crustaceans, fish and cephalopods. Blackwater diving here yields many rare creatures, many in larval form, floating up from the depths.

There are also as many as 75 dive sites sprinkled around Sombrero Island, Maricaban Island, Cathedral and Mapating, hosting barracudas, jacks, trevallies, reef sharks and healthy corals. The area is easily accessible by car from Manila.

Mindoro

Split into two administrative halves, and separated by a mountain range, Oriental Mindoro is the southwestern part and Occidental Mindoro is the northeastern half. Oriental Mindoro was once a mining province, but the waters are starting to attract ocean lovers for its healthy reefs, schooling fish and pelagics.

Apo Reef is one of the major diving attractions in the region. It is the world's second largest connecting coral reef system, after the Great Barrier Reef in Australia. The dive spots are reachable on liveaboards, and day trips from Batangas, Puerto Galera or Coron.

Marinduque

An emerging destination for diving, Marinduque Island lies between Tayabas Bay and the Sibuyan Sea – ideal for an island getaway from the city's hustle and bustle. Divers have many dive site options for macro, wide angle, reefs, walls and wrecks.

Romblon

No longer a secret for harbouring rare critters, Romblon is now a magnet for divers who are willing to take a little more time in their journey to get away from the popular, well-known destinations, to a paradise of white-sand beaches, untouched reefs and clear waters. AD

THE TOGEAN ISLANDS

Dr Anuar Abdullah takes his team on an expedition to explore the world's oldest coral reefs

Text by **Dr Anuar Abdullah**, Images by **Ocean Quest Global**

The Togean Islands are some of the remotest islands in Southeast Asia. Located in the Gulf of Tomini in Sulawesi, they are a likely centre of coral diversity in the Coral Triangle. The journey that took us there was long, but the expedition was necessary to unravel facts that may change our perceptions of the state of health of corals in our oceans.

There are 66 islands and offshore islets in the Togean Islands National Park. Within these are four major islands – Batudaka Island, Togean Island, Walea Island and Una Una. Our expedition focused on Una Una, a small volcanic island created by the Colo volcano that reaches a peak of about 507 metres above sea level.

THE EXPEDITION

This is part of a global expedition to catalog corals and develop a technological system scuba divers can use in the field. The discipline of coral taxonomy must grow alongside other sciences. Only through positive developments can more people participate and contribute to the global knowledge on corals. We are here to explore what may be the world's oldest and most diverse reef. In Una Una, the expedition team was hosted by the Sanctum Una Una Eco Dive Resort, which is also affiliated to Ocean Quest Global. This partnership made the expedition possible.

Shutterstock

"Only through positive developments can more people participate and contribute to the global knowledge of corals."

SOCIO-DEMOGRAPHICS

The Togean Islands have a population of about 25,000 people, but there are only about 200 of them living on Una Una. The people of this small island protect their reefs fiercely, and outsiders caught blast fishing around Una Una are severely punished by the local community – a model that should be adopted by all the islands in Indonesia. Industry players like resorts and dive centres also lend a hand to conserve the environment. We were lucky to meet with the teachers at Sanctum Una Una, who provide coral education in the local school. An agreement is in effect to help the school and ensure environmental literacy of the island's inhabitants.

PRE-EXPEDITION TRAINING

The complexity of a coral cataloging expedition includes training all members of the team to identify corals and their roles in the process. These tasks cannot be accomplished without systematic training, and the training must also be done swiftly without sacrificing valuable exploration time. Before the cataloging dives started, our team of experienced divers were given two days of the Ocean Quest Global – Coral Cataloging Course Level 1.

DIVE SITES

There are over 40 dive sites around Una Una, and many more remain unexplored. Depths at dive sites range from eight to 40 metres.

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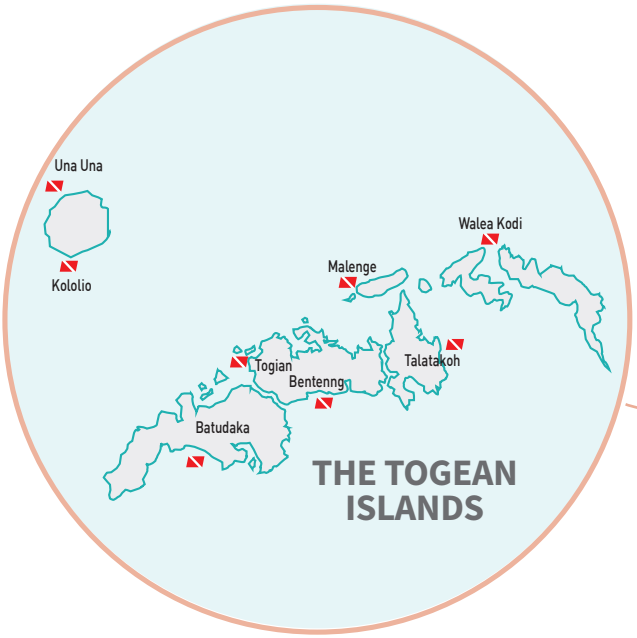
A diver scans a reef filled with *Turbinaria* corals

<
An aerial view of the *Bajo* sea gypsy village in the Togean Islands

At these dive sites, the transition of species from different depth zones can be observed. Pinnacles jutting up from the abyss are covered with corals. Diving in Una Una was like watching the evolution of coral reefs. From the youngest reef flats to towering barrier reefs, it can all be seen in this location. It will take the expedition team many trips here to document all the sites.



> v
Huge clusters of *Euphyllia* cover the reefs at Una Una

>
The massive size of the size of the reef-building *Montipora* corals suggests they have been here for thousands of years

>>
The Togean Expedition team with Dr Anuar (fifth from left) after their two-day training of the Ocean Quest Global – Coral Cataloging Course Level 1

THE BLACK FOREST

The focus of this expedition was to explore and catalog corals at a location called Black Forest. This site is located just eight minutes south of the equator. The towering geological structures built by the corals that made the atolls and islands can be seen here. In some parts, this fringing reef developed into a barrier reef. It certainly is the go-to site to observe the evolution of hermatypic corals (reef-building corals that form the stony framework of the reef) and how reefs are formed. There may not be other places in the world where corals are this old, and display such impressive size and abundance. Here, pioneer species like *Acropora* that once formed the substructures of the reef have been replaced by the true reef-building corals.

The reef has now been taken over by true reef-building coral genera like *Galaxea* and *Montipora*. Their massive sizes suggest that they may have been here for thousands of years. At this site, the range of the coral colonies and how they are packed together, combined with the crystal-clear water, is a sight to behold. Until now, no one has fully explored and cataloged the corals here. The magnitude of the work needed is too overwhelming for anyone to comprehend.

LIVING UNDERWATER ENCYCLOPAEDIA

However, the development of technology in the field of coral species mapping is underway and will change this perspective. The Black Forest is a living, underwater encyclopaedia of hermatypic corals. Large patches from different genera populate sections of this reef, many from the surface to a depth of 25 metres. In other parts of the Coral Triangle, these genera display small clusters that often rarely exceed the size of a soccer ball. At the Black Forest, these colonies are several metres tall.

EVOLUTION OF REEFS

From the perspective of a naturalist, things are best explained by seeing the transition that takes place. Here, the reefs display many stages of their evolution. Development from a reef flat to fringing, then to barrier reefs are evident just off the shore of Una Una. At the periphery of the Black Forest, the reefs are younger. There, the pioneer genus like the *Acropora* can be found. As these pioneer species die out, an embankment of substructure is created where a transition of species takes place. The cycle of living, dying and recolonisation is well demonstrated by the coral species just off the shore. After the formation of the substructure, the transition to true reefs begins. The reef then displays higher diversity due to the mix of hermatypic species. Competition for space begins, and the hermatypic corals take over the reefs to begin their biomineralisation into towering structures typical of barrier reefs.


OCEAN QUEST
adidas

BUILDING FOUNDATIONS

Galaxea, a genus known to be slow-growing and encrusting, has shown impressive development here, forming towering bommies of solid aragonite. These corals are hardy and resilient to the changing sea conditions. Some species of *Montipora* were also responsible for the formation of the Black Forest. From this observation, we can develop a better understanding of the natural processes in the development of coral reefs.

The formation and transition of reefs are visible only on this coral reef. Other areas in Southeast Asia may have young reefs that are not yet ready for transition. Sadly, many young reefs in the region may not survive to this stage because of habitat destruction. Unregulated tourism is responsible for part of the damage to the reefs. Effluent discharged from resorts and industries have also contributed to the decline of many reefs.

HARNESSING TECHNOLOGY

The magnitude of the endeavour to catalogue the corals here is immense, and newer technology had to be used to accomplish this otherwise near-impossible task. Photogrammetry and imaging technology was used extensively during this expedition to document the existing reefs and explain their evolution. This technology was also used to study how species transition from newer to older reefs. A geographical information system (GIS) is incorporated to map the positions of the reefs.

Artificial intelligence was also adopted during this expedition to help speed up cataloging and the observation processes. This included image recognition technology and oceanographic data gathering. When data on coral morphology were fed into the artificial intelligence program, the devices learned to recognise and match the features of corals. When the system couldn't find a match, it assigned a new name to the coral that observers could return to and add new data. This valuable process saved time and energy, prevented data from overlapping, and minimised errors.

THE CORAL CATALOG

This expedition contributed to the new global catalog of corals that can be used by scuba divers in the field. It also contributed to the development of AI technology in coral

cataloging. In the past, scuba divers tended to shy away from cataloging corals because of the complex process. The Ocean Quest Global – Coral Cataloging Course allowed for systematic training and application of the technology especially for field-level observations. The new catalog also omits all the old lists that have little value to field observers. Skeletal level taxonomy was separated from this cataloging as most past observations were made in museums before the advent of scuba.

Observations made by past taxonomists who did not see the living specimens were omitted. Catalogs of corals with images added by recent observers to descriptions made by past taxonomists were also omitted. This was necessary to eliminate all discrepancies common in the previous catalogs. The new system of cataloging is very diver-friendly. It also includes modular training and easy-to-understand instructions. Moreover, it can be paired with technology-based artificial intelligence systems.

FUTURE EXPEDITIONS

This expedition is a mere introduction to what will unfold in the future. By starting the expedition in the Togean Islands, we can catalog the corals and develop further understanding of species transition in the evolution of reefs. From this site, the expedition will continue to explore other locations within and beyond the Coral Triangle. Moving outwards from this epicentre, we expect to discover more sites and open more opportunities for divers and coral enthusiasts. AD

< v
Pachyseris corals are commonly known as elephant skin coral due to their wrinkly appearance

<
This is a mix of coral species on a young reef flat

About Ocean Quest Global

Founded in Malaysia in 2010 by Dr Anuar Abdullah, this environmental organisation has created its own techniques, methodology and material for coral reef rehabilitation after years of research. Through its programmes and courses dedicated to securing a sustainable future for coral reefs, the organisation focuses on giving back to the local communities and protecting the marine environment.

For more information on future expeditions, go to *www.oceanquest.global* or email *anuar@oceanquest.global*

OCEAN QUEST
DIVING WITH PURPOSE

REEF WORLD

How Two Women, Two (Green) Fins and a Love of Diving Have Led to Positive Global Ocean Change

Chloe Harvey and Natalie Harms share a vision – that the marine tourism industry can thrive in symbiosis with Nature. A visit to tourism hotspots might make you feel like this might not actually be possible. There's a visible myriad of challenges the local marine environment faces due to the influx of tourists. There are pockets of success stories though, people and places benefitting from tourism, while having a close-to-zero impact on coral reefs and the incredible marine life they support.

LIFE OF CHLOE

Chloe Harvey is a British marine biologist who first learned to dive when she was 11, in 1995. She well and truly caught the bug, and became a BSAC Assistant Instructor by age 15. She spent most of her teenage years exploring the sites of the UK coastline and inland lakes (aka duck ponds) with her dad and sister. It was Chloe's dad who really made it all possible, planning the next underwater adventure before the previous one had finished, and making sure they had all the kit!

CAREER WITH POSITIVE IMPACT

Chloe was more than happy to be taken along for the ride, often finding herself well out of her depth, but her dad's neoprene-gloved hand was never far away to guide her back to safety. Chloe was lucky enough to visit a few far-flung places in those early years of her diving career, and seeing the huge variety of marine life in the warm tropical waters drove her to seek a career that positively impacted this incredible environment. It's been almost 30 years, and now as Directors of The Reef-World Foundation, Chloe and her husband, JJ, have been leading the Green Fins initiative for almost 15 years. Together, they have transformed Green Fins from a local dive programme to a global one, which is now internationally recognised as the only environmental industry standard.

v
Natalie chairing the Sustainable Diving Dialogue at ADEX Singapore 2023

NATALIE'S EARLY INFLUENCES
Natalie Harms also learned to dive very early – at 15. Her mother had been diving for many years, and when they were living in Egypt, she encouraged all of her children to learn it. Till today, at the age of 66, Natalie's mother is an avid diver, finding every opportunity to get in the water. Enjoying these family adventures also opened up an interest in Natalie to protect this "new" world. She was in awe of that feeling, of facing a bright and buzzing coral reef scene, one she otherwise would have no idea existed. This is one of the reasons she works in the environmental field, and now coordinates the marine litter efforts in the COBSEA Secretariat (the Coordinating Body on the Seas of East Asia) at the United Nations Environment Programme (UNEP), including addressing ghost gear in the East Asian Seas.

DYNAMIC DUO IN ACTION
Given their similar life experiences and dedication to protecting the marine environment, it's unsurprising that Chloe and Natalie began to work together on tackling an issue close to both their hearts – making the global diving industry more sustainable. In 2017, Chloe worked with the UN to bring the first in a series of sustainable diving events to ADEX in Singapore, pioneering these events to help push the industry's sustainability needle in the right direction. With the ongoing support of the UW360 team, these events have repeated each year (pandemic years excluded), and been replicated at other trade shows under Chloe's leadership. Chloe and UNEP will deliver them again to the ADEX audience in Singapore this year.

LATEST BUYING TRENDS
Reef-World's recent Sustainability Survey indicates that diving trips are more topical than ever. The results show that post-pandemic dive tourists want more sustainable holiday options, and more transparency around options coined as "environmentally-friendly" during their dive trips. Eighty-three percent of dive tourists said they are looking for some sustainability education on their holidays, and 75 percent are willing to pay more for operations that have adopted best practices on sustainability. The data indicates that these trends are stronger among the "Gen Z" and millennials, those with the biggest buying power today and tomorrow. This is a clear business case for aligning your business and services with sustainability.

ACTION FOR THE FUTURE
Chloe and Natalie have had the privilege of becoming mothers in recent years. While they very much look forward to the day they can teach their children to dive, this prospect is clouded with a feeling of trepidation. Will there still be live coral reefs when this time comes around? The reality is that we're likely to lose coral reefs before 2050 unless, as a collective global community, we take drastic action.

v
Chloe and Natalie at ADEX in Singapore 2019 to run the Sustainable Diving events

PASSION ON FIRE

Chloe and Natalie cling to the hope that their work continues to drive change in behaviours, to slow the decline in reef health, and to build their resilience. Scuba diving lit a fire of passion within both of them to dedicate their lives to environmental protection. They are confident that harnessing the energy of divers across the world to lead the way in driving sustainability across the tourism industry will give coral reefs the chance they need to survive long into the future.

So, join Chloe and UNEP this year at the Sustainable Diving Think Tank on Friday, April 12 from 12:30–2pm on the Image/Film/Book Festival Stage. This event is an industry-only workshop (dive pros and business leaders from all industry segments) to pull apart some of our industry's main environmental challenges today.

Following this, the Sustainable Diving Dialogue will be held on Sunday, April 14 from 12:30–1:30pm on the Main Stage – an open discussion (for all industry players and consumers) with a series of panellists who are the leading movers and shakers in sustainability. Learn from the best, ask questions and get involved in the movement. AD

Why join the Sustainable Diving events?

- Network with the movers and shakers in conservation and sustainability in your sector
- Walk away with insights into the latest business trends
- Make connections and learn about simple and practical ways to mainstream sustainability into your business practices immediately
- Enjoy the benefits of sustainability. The consumers you will attract are willing to pay more, return for more, and promote your services among their online networks

THE REEF-WORLD FOUNDATION | GREEN FINS INTERNATIONAL COORDINATOR

< Chloe Harvey working with the Green Fins Egypt team

< v Natalie and her family learned to dive when she was 15

HOPE FOR THE FUTURE

Nine-year-old Martin Leung from XCL World Academy chose to write about the ocean for one of his class assignments. His fresh insights about what he's learned and what he wants to teach all of us is both endearing and inspiring. The essay is presented verbatim; only typos were corrected.

MARTIN LEUNG
GRADE 3, 9 YEARS OLD

Do you know that the ocean is an amazing place on earth? It has its own climate, animals and human interactions. It is also the biggest biome covering 71 percent of the planet. Today, I am going to teach you about the ocean animals, climate and human interactions. I hope you enjoy this article!

I am going to teach you about the climate in the ocean. The ocean is packed with many different creatures and islands. Some islands are more than 800,000 miles big and some islands are so small that you can walk across in less than one minute! The deepest point is Challenger Deep which is about 11,302 metres deep. If Mount Everest was put in there, it won't touch the bottom! And the five oceans are the Pacific Ocean, Atlantic Ocean, Indian Ocean, Southern Ocean and the Arctic Ocean.

Now, I will teach you about what animals live in the ocean and how they live in the ocean. The first animal I will teach you about is the squid's adaptations. The squid uses its tentacles to hunt for its food. Now I will tell you about sea snails. Sea snails have a poison that can make the predator sick if eaten. This is its adaptation. They can even hunt with their sense of smell! Now, the final animal I will be teaching about is the Japanese squid. They can eat algae as food. One example of food

chains are seaweed, then a shrimp, then a fish and then us humans! Another example is seagrass, then a fish, then a shark and finally bacteria.

Now, the most important part of the article is how plastic affects the ocean. Plastic can trap animals and make them sick by eating them. This results in marine loss of life and extinction to great species. They also destroy coral reefs and other marine plants. And some animals get hungry and then die of starvation because their prey is dead. Which means, no food. We pollute the ocean because we throw trash instead of recycling the plastic. People throw away trash because we don't need it. And if we throw lots of plastic away, I don't think we care about marine life.

Did you learn about the ocean? I hope you learned something about the ocean. Now, you know how the ocean is very unique. I hope you liked this article. Now, you know about the ocean animals, climate and human interactions. Bye-Bye! AD

IT STARTS WITH PASSION

Dragon Dive Komodo was established with a vision to provide an unforgettable diving experience in the heart of the Komodo National Park. The founders, passionate divers themselves, were captivated by the rich marine biodiversity and the stunning landscapes of Komodo. They aimed to create a dive resort that not only offered top-notch diving services, but also promoted eco-friendly practices and community involvement.

> A manta ray in Komodo

> ^ LEFT TO RIGHT: The *Shenron* can take up to eight divers; rooms are bright and airy; their dive centre has everything a diver needs

VARIOUS ACCOMMODATION OPTIONS

Their resort boasts a variety of accommodation options, with 19 upgraded rooms that can comfortably accommodate up to 38 guests. They cater to the needs of both divers and non-divers, ensuring a comfortable and memorable stay for everyone.

ADDED SPECIAL FEATURE

They also offer liveaboard trips on the *Shenron*, a *phinisi* that can accommodate up to eight divers. Itineraries take guests around Komodo, Alor and the Banda Sea.

SUSTAINABILITY AND DEDICATION

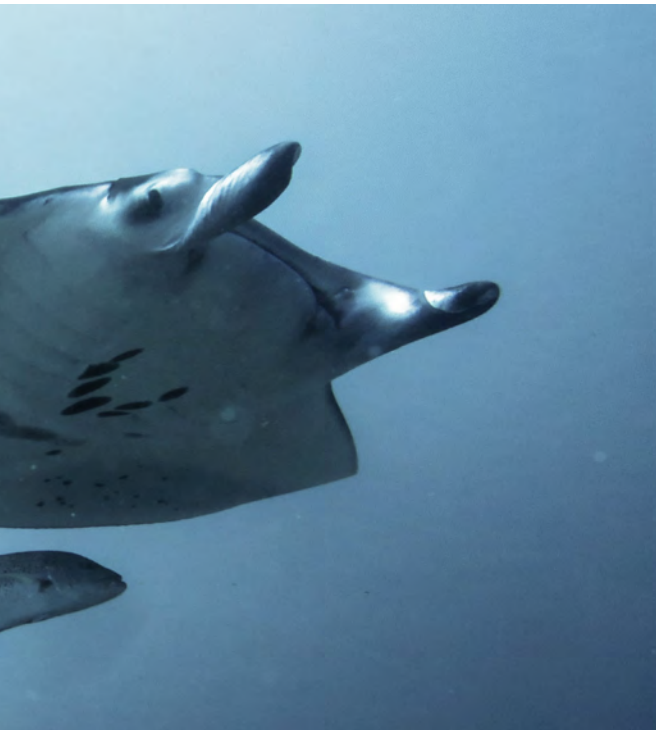
What sets Dragon Dive Komodo apart is their commitment to sustainability and dedication to providing personalised diving adventures. Their PADI 5-star IDC dive centre offers a wide range of diving courses from PADI as well as TDI tek courses with the AP Rebreather and excursions, guided by experienced and knowledgeable instructors.

PERFECT CHOICE FOR TRAVELLERS

They believe that their resort offers a unique blend of adventure, relaxation and eco-consciousness, making it the perfect choice for travellers seeking an authentic and memorable experience in Komodo. Also, Komodo has the biggest concentration of reef mantas (*Manta alfredi*) in the world. AD

> A moray eel enjoying some attention from the photographer

> > Komodo dragons are endemic to the Komodo and Flores Islands

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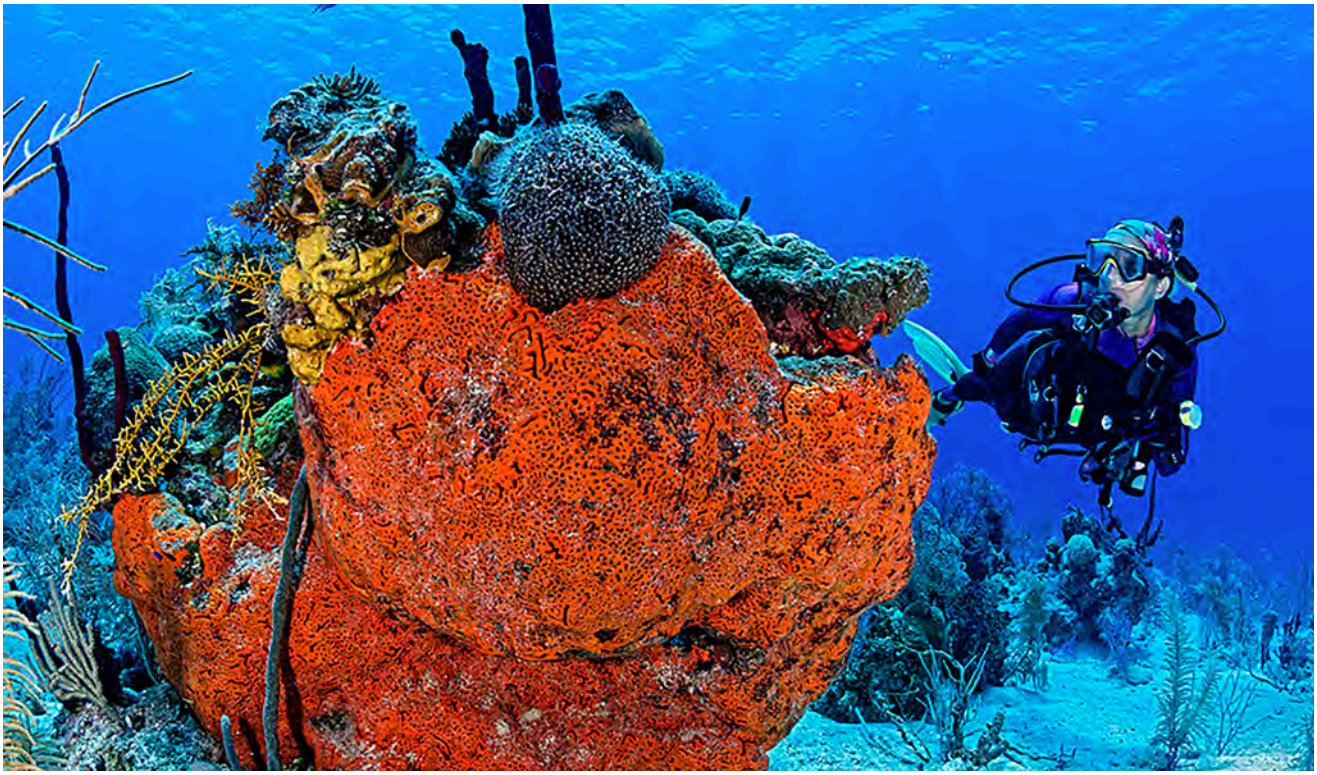
www.dragondivekomodo.com

ADVERTORIAL

GREEN THE FLEET

AGGRESSOR

How Aggressor's sustainability programme strives to make the adventure lifestyle environmentally sustainable for their guests



Aggressor Adventures is working to eliminate single-use plastics at all their destinations, beginning with plastic straws, cups, and utensils, as well as replacing single-use plastic water bottles with reusable ones.

SUSTAINABLE INITIATIVES

Aggressor has incorporated several sustainable initiatives across their operations, including switching to energy-efficient LED lights, sourcing seafood from local, sustainable fisheries, and purchasing locally, sourced meats and produce, participating in local recycling efforts and donating any items that are still in good condition to local charities and communities, prioritising purchasing beverages in glass bottles or cans, and providing each guest with complimentary reusable water bottles where available, prioritising using primarily non-toxic, biodegradable cleaners, among others.

"TRACKING OUR TRASH" INITIATIVE

The goal of this initiative is to better understand how and where the trash and recycling is handled after it leaves their operations and enters the local communities. The initiative started with their Caribbean yachts in 2022 and is expanding to all Aggressor yachts and properties.

REEF-SAFE

To further protect the reefs, Aggressor's Green the Fleet initiative will provide Stream2Sea coral-safe sunscreen and shampoo for divers, available at select destinations.

<< Divers can protect the activity they love with Aggressor's sustainability initiatives

< The range of Stream2Sea products adopted by Aggressor Adventures

v A scuba diver removes plastic from the reef

Shutterstock

All their welcome briefings include information about their environmental initiatives, conserving water, and the importance of respectful interactions with wildlife. They have a free, comprehensive Sustainable Travel Guide you can download, complete with a suggested packing list and recommended products.

In addition, Aggressor Adventures supports the Sea of Change Foundation, their conservation charity of choice. The foundation was founded by Aggressor's CEO, Wayne B. Brown, with the mission to create positive change in the natural world we all love to enjoy and explore. All funds raised go directly to conservation projects around the world focusing on three key areas: Coral Reefs – Restoration and Resilience; Ocean Pollution – Public Awareness, and Action; Threatened Species and Habitats.

www.aggressor.com AD

AGGRESSOR ADVENTURES · Green the Fleet · SEA OF CHANGE

DAN IS FOR DIVERS

Connecting divers with the right assistance

Text by **BILL ZIEFLE, DAN President and CEO**, Images courtesy of **DAN**

Learning to scuba dive became mainstream by the early 1980s. After the recession in the mid-1970s, people with good-paying jobs and the increasing opportunities to travel were exploring the oceans with brand-new scuba gear strapped to their backs. DAN was created in 1980 to connect injured divers with experts who could get them the care they needed.

LIMITATIONS IN THE EARLY DAYS

The medical professionals answering the phone at DAN were able to direct injured divers from anywhere in the world to the closest facility that could provide appropriate treatment. But emergency room visits were expensive and recompression treatment often cost much more. Hospitals, especially those in remote locations, were often reluctant or unable to accept divers' primary health insurance. Even if a diver found a facility that accepted their medical insurance, those policies would often limit or exclude coverage, because the diver was injured while participating in an adventure sport.

DAN'S GOAL TO HELP DIVERS

Some divers struggled to cover the costs of their treatment. DAN created membership and dive accident insurance coverage in 1983 to help divers cover the costs of evacuation and chamber treatment. Some in the insurance industry thought the programme would fail – why

create something to cover an inherently risky activity that might incur expensive medical treatments? The reality of insuring divers was unappealing to most underwriters, but fortunately DAN's goal was to help divers, not turn a profit. It still is.

TEACHING DIVERS TO BE INCIDENT- AND ACCIDENT-FREE

The DAN dive accident insurance was created by divers, for divers. The divers who created these products understood that the risks of scuba diving could be managed with proper training and adherence to standards, but they also knew that accidents can happen despite the best efforts to prevent them. DAN staff are experts in dive medicine, safety and research, and they do it all to teach divers how to keep their diving incident- and accident-free.

COMPARISON WITH OTHER COMPANIES

As divers themselves, the DAN staff saw, firsthand, the necessity for dive accident insurance, and designed plans to meet divers' unique needs. Other companies may offer some coverage for dive injuries, but many impose unrealistic and restrictive limits on their coverage, such as a shallow depth limit. Some impose benefit limits that don't begin to address the cost of treatment or evacuation.

SERVICE LIKE NO OTHER

Between membership and insurance benefits, DAN covers divers for the real situations they face doing what they love. When you call DAN for assistance, you are connected with DAN's medical staff of physicians, nurses, emergency medical technicians (EMTs), paramedics and other medical professionals. No other dive accident insurance programme offers such a service. While all insurance companies are legally obligated to pay claims, only DAN provides a 24/7, year-round dive emergency hotline staffed by the best in dive medicine.

DAN WILL GET YOU THE HELP YOU NEED

Others might be there when you get home; DAN will be there to ensure you get the help you need to get home. Since its implementation, the DAN dive accident insurance programme has served not only divers but also the entire community. From the beginning, DAN has reinvested profits from membership fees and dive accident insurance premiums to make the world a safer place to dive – and it still operates that way today.

<

DAN ensures divers enjoy their sport as safely as possible

v

DAN helps divers and operators prepare, and be ready for, any emergency

^
DAN is always ready to assist divers

PROFITS REINVESTED

Profits from DAN's programmes are reinvested in the DAN Foundation, which supports the 24/7 DAN Emergency Hotline, DAN Research, the Recompression Chamber Assistance Program, DAN Training, oxygen unit grants, and continuing medical education courses for medical professionals who specialise in dive medicine.

AFFORDABLE INSURANCE

Divers worldwide rely on DAN for guidance to prevent injuries and accidents when they dive, and we can provide this guidance thanks to the support of our members. Dive accident insurance is just one of the many ways DAN works to keep divers protected, and because of our mission to serve divers, we are dedicated to keeping these products affordable.

LEADING DIVE SAFETY ASSOCIATION

DAN became the world's leading dive safety association through its dedication to helping divers and by giving divers the coverage and resources that no one else can offer. We will continue to lead by helping divers whenever they need us. DAN WORLD

<
William Ziefle
President and CEO of DAN

DAN'S ENVIRONMENTAL STEWARDSHIP COURSE FOR DIVE OPERATORS/ PROFESSIONALS AND DIVERS

Dive operators, professionals and recreational dives can all be stewards of the environment every day. DAN's e-learning course is designed to generate an awareness of the importance of protecting the environment, and discusses: Environmental Sustainability Plans, Protecting our Waters, Common Ecological Threats, Sunscreen Safety, and more. Protecting the environment is not an individual effort but a series of goals that can only be achieved through the commitment of the entire diving industry.

To access this free course, visit *http://world.dan.org*, and select *Education & Events – eLearning*


DAN WORLD
DAN protects us,
one dive at a time.
+ 24/7 Emergency Medical Services
+ Worldwide Emergency Medical Evacuation
+ Dive Accident Treatment Coverage
YOUR DIVE SAFETY ASSOCIATION
SAFETY | MEDICAL | RESEARCH | EDUCATION | DIVE ACCIDENT ASSISTANCE
WORLD.DAN.org

GREAT ACCOMPANIMENTS TO YOUR NEXT DIVE ADVENTURE!

1 FOURTH ELEMENT SHORELINE TECHNICAL JACKET

Ready for adventure, wherever you are

The unisex OceanPositive™ Shoreline Jacket is your go-to for packable protection from the elements. Ready for all your dive adventures, it packs up into the hood so it's small enough to bring, no matter where you are going. It comes with inner taped seams, water-resistant YKK Aquaguard zips, an adjustable peaked hood with hidden ergonomic toggles, and adjustable Velcro cuffs. It's a versatile and effective waterproof and windproof shell both on sea and land. The jacket is made from 100 percent recycled polyester, and offers a 5,000mm HH waterproof and 5,000g breathability rating.

www.fourthelement.com

2 HALCYON UNIVISION MASK

Wide-angle vision

Its unique shape and ultra-low volume profile can fit a wide range of faces, especially the smaller and narrower ones. Enveloping a single lens, this compact and durable mask is a perfect, pocketable back-up mask that has remarkable clarity and a wide field-of-vision.

www.halcyon.net

3 AOI UH-GPX

Underwater Housing for GoPro Hero 11/12 Cameras

In an exciting collaboration with professional underwater videographer, Kay Burn Lim, AOI has developed a cutting-edge underwater housing for GoPro cameras as part of a new product line, the "Signature Series". Milled from aluminium, the housing is built to withstand the harshest underwater environments, features advanced optical elements to enhance images and video capture, comes with its hugely popular quick-release systems for attaching and mounting lenses, a full HD monitor, and is depth-rated to 60 metres.

www.aoi-uw.com

4 SCUBAPRO SEAWING SUPERNOVA BLADE

More colour for your dives

Winner of the internationally-recognised Red Dot Award for product design, ScubaPro has upped their game with a selection of new colours for their interchangeable blades on the Seawing Supernova fins. These versatile fins are not only made from the finest, most durable materials, the Pivot Control Technology always provides the optimal angle-of-attack for maximum propulsion. The blades are now available in blue, pink, yellow and turquoise.

www.scubapro.johnsonoutdoors.com

5 STREAM2SEA SPF40 ZINC SUNSCREEN BALM

Full-spectrum protection

Formulated with EcoSafe Zinc™, a non-nano mineral that applies sheer and provides full-spectrum protection from both UVA and UVB rays, this concentrated, water-free formula is 100 percent USDA Certified Bio-based, EWG Verified to be safe and sustainable, and contains no synthetic preservatives or fragrance. Packaged in an infinitely recyclable and reusable aluminium tin, this is the perfect reef-safe sunscreen for your diving adventures.

www.stream2sea.com

BOOKS

Some great reads to fill up your surface interval time!

1 25 FUTURE DIVES

By **Klaus M Stiefel** and **James D Reimer**

What will you see when you go diving in the future? Will humanity stop its ever-increasing stress on our home planet's marine ecosystems? Will we stop burning enormous amounts of fossil fuels? Will we stop throwing gigantic masses of plastic trash into the oceans? Will we regulate fishing and avoid further polluting the oceans? Depending on the answers to these important questions, different futures will give rise to different kinds of future diving.

The authors, also marine biologists, imagine the state of a future world, and what it will feel like diving in a very different ocean, considering the many environmental problems our world is facing in the present. They communicate important concepts in marine environmental science in a way that's fun, easily comprehensible and science-based for the interested layperson. *25 Future Dives* speaks to divers, snorkellers and other ocean lovers.

The book will be launched at ADEX Ocean Mission 2024, at a special price of SGD25. It will also retail online for USD19.90.

2 TWO WORLDS: ABOVE AND BELOW THE SEA

By **David Doubilet**

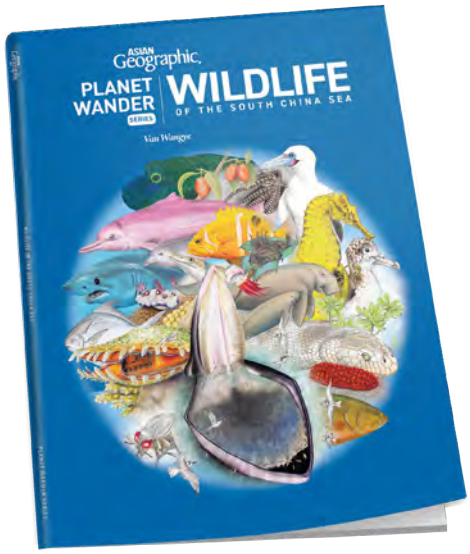
With essays by **Kathleen F. Moran** and **Kathryn D. Sullivan**

David Doubilet's innovation, eye for beauty, and passion for conservation have long set the bar for underwater photography. In this remarkable, highly-anticipated collection, the longtime contributing photographer for *National Geographic* unites life above and below the water's surface.

Spotlighting a stunning selection of images from Doubilet's 50-year career, spanning the Galápagos Islands to the Red Sea, the icy waters of the Antarctic Ocean to the tropical Great Barrier Reef, this body of work raises important questions about conservation and global warming, topics never far from the headlines. "I want to create a window into the sea," says Doubilet, inviting people to see how their world connects to another life-sustaining world hidden from their view. Doubilet's photographs are accompanied by an introduction by Kathy Moran and an afterword by Kathryn D. Sullivan.

David Doubilet will be the guest-of-honour at ADEX Ocean Festival 2024

Available at *www.phaidon.com*



First of a Trilogy
Part of the *Asian Geographic* Planet Wander Series

3 WILDLIFE OF THE SOUTH CHINA SEA

Written and Illustrated by **Van Wangye**

The artist has broken up the featured fauna into several unique categories to cover more than the usual marine and land animals you would normally find in children's or young adult books. Focusing his first-of-three books on the charismatic species of the South China Sea, his research has also inevitably led him to touch on how cultures, religions and politics play a role in this dynamic region.

Van Wangye will be talking about his book and his art at ADEX Ocean Festival 2024.

Talks on Technical Diving
Volume 1
Genesis and Exodus

4 TECHNICALLY SPEAKING

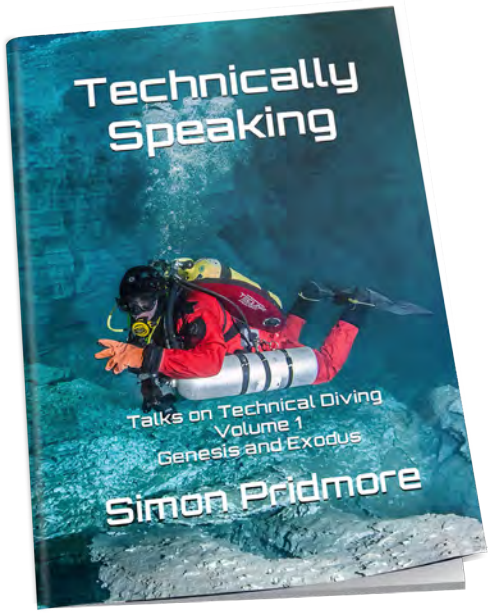
By **Simon Pridmore**

The latest book from best-selling scuba series author, Simon Pridmore, this is a selection of themed talks about the early history of technical diving – where it came from, how it developed, expanded across the world, who the important movers were, and how, in the decade from 1989 to 1999, the efforts of a few determined people changed scuba diving forever.

These 10 years saw the greatest shake-up the sport has ever seen. Technical diving's road to universal acceptance was anything but smooth: Many obstacles had to be overcome and there were times when, even viewed in retrospect, it seemed that its advocates might fail in their mission. Ultimately, success came down to perseverance, people power, good timing and more than a little luck.

Simon will be speaking and moderating panel discussions on the TekTalk stage at ADEX Ocean Festival 2024.

Technically Speaking is available via Amazon Worldwide, Apple, Kobo, Tolino, Audible and many other websites in paperback, hardback, e-book and audiobook versions. Simon narrates the audiobook himself.



5 70/30 OCEAN CULTURE DIFFERENT SHADES OF BLUE

With Editor-in-Chief, **Hidy Yu**

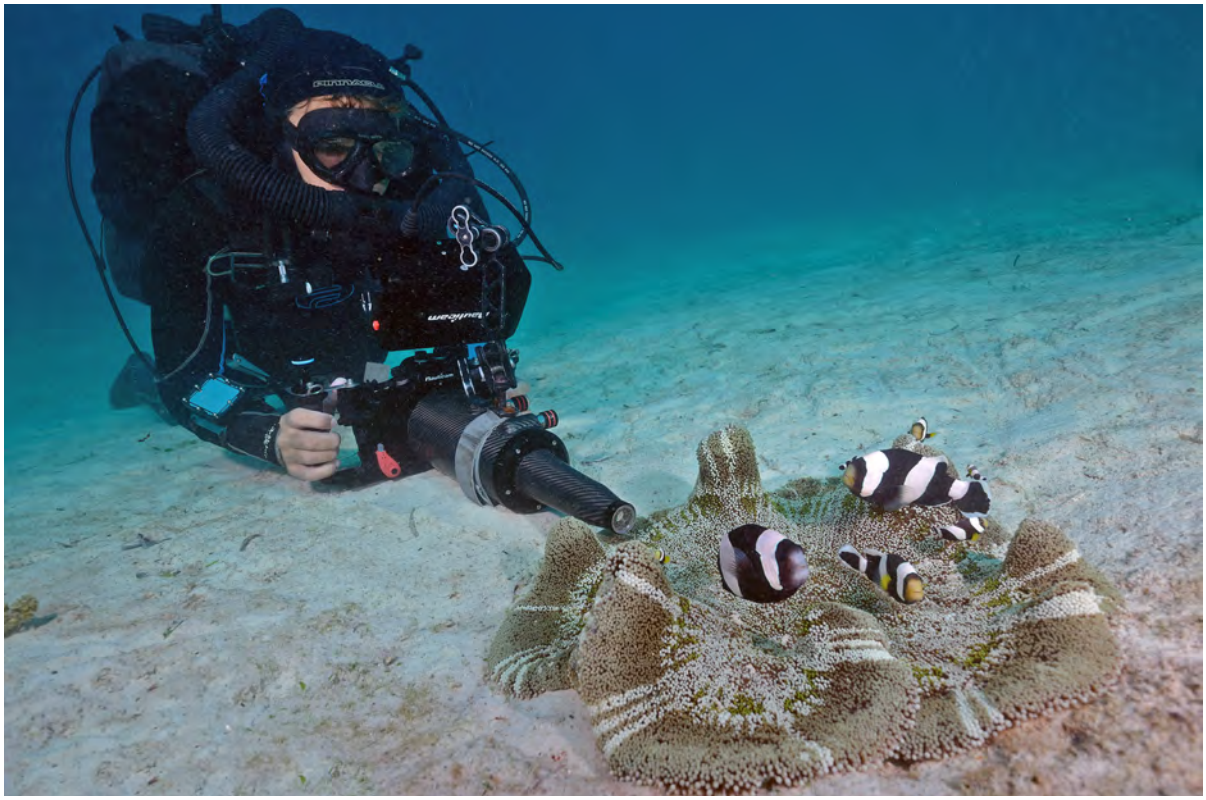
Brainchild of Hidy Yu and publisher, John Thet, this book's primary objective is to spread awareness about ocean culture, encourage collaboration, and safeguard marine communities, to create a brighter future for generations to come. They want to urge everyone to come together, cooperate and join forces to bring about positive and meaningful change. This edition is written in Traditional Chinese (传统中文) to include the Hong Kong and Taiwan markets, to learn, lead and inspire more people to contribute to safeguarding the ocean. The book will be launched on World Oceans Day, 8 June 2024.

Cover Photo by **Shane Gross**

SCOPING YOUR SUBJECT WITH THE NAUTICAM EMWL

Text and Images by **Jason Isley**

Pro shooter Jason Isley shows the amazing perspectives made possible by the Extended Macro Wide Lens



Shortly after I started underwater photography, I came across one image that simply jumped off the page and made me ask – how did they get that shot? The image was a leaf scorpionfish almost filling the frame but with a magical sunburst in the background – a macro subject but with a wide-angle perspective, and with incredible sharpness. Before I met the photographer, I attempted the shot with other subjects using a rectilinear lens and close-up diopters – it didn't work! I eventually met Yogi (Juergen Freund), the photographer, and questioned him about the image. It turned out it wasn't a lens simply purchased off the shelf, but one he had adapted.

THE DAWN OF WIDE-ANGLE MACRO

Digital cameras then came along and when the Tokina 10–17mm fisheye lens overtook wide-angle underwater photography, the minimal focus distance was incredible. Furthermore, attaching a teleconverter and placing it behind a mini-dome soon became a great tool for wide-angle macro shots.

"Digital cameras then came along and when the Tokina 10–17mm fisheye lens overtook wide-angle underwater photography, the minimal focus distance was incredible."

< Roger Munns filming anemonefish with a fabricated scope for the *BBC's Blue Planet II*

^ Saddleback anemonefish tending to their eggs in Mabul Island. Taken with the Nauticam EMWL with 160° objective lens

SETTING UP THE "BUG-EYE"

For many years, I used this setup but it wasn't the "bug-eye" look I was after. Then, a manufacturer created the perfect tool – Inon brought out their "bug-eye" lens, although it had limitations on what camera it could be used on. I chose not to buy one and instead decided I would make my own relay lens. A relay lens is basically a macro lens at the base, a relay in the middle, which turns the image the right way up, and then a small fisheye lens on the end. The macro lens is essentially for focusing the image on the rear glass of the fisheye lens.

A CHANCE ENCOUNTER

After lots of research online, I tried to put everything together, but it was clumsy, huge and impractical. I attempted to use it on two dives in Lembeh and it was a disaster! Around the same time, I was working on BBC's *Blue Planet II* with Roger Munns and there was a scope lens in one of their boxes. It was used on a Sony Alpha 7 in a Nauticam housing, but the setup was basically a manufactured relay, using a Nikon 200mm lens, relay section and what appeared to be GoPro lenses on the end. The images Roger filmed with this setup amongst the anemones were exactly the effect I was after.

SPIT-BALLING THE UNDERWATER RELAY LENS

Shortly after *Blue Planet* filming was complete, I found myself at ADEX chatting with Edward Lai, Founder and Managing Director of Nauticam, and explained how the world of underwater photography needed a scope of this quality. I showed him pictures of the lens and the effect it created. Of course, Edward was aware of the Inon lens and the "macro wide-angle" method, but how easy would it be to create an underwater relay lens?

A GROUNDBREAKING LENS SYSTEM

Fast-forward six years and we have the Nauticam Extended Macro Wide Lens (EMWL) system, a groundbreaking lens system specifically designed for macro wide-angle photography. It isn't the only option in the market though. LOAWA also have a scope system that can be used underwater. However, it's a fixed lens with a high aperture. The advantage of the EMWL is that it offers the flexibility to switch between different objective lenses at the far end of the scope – 60°, 100°, 130° or 160°. You can also remove the scope underwater, and just use the macro lens you have on your camera, in my case, a Nikon 105mm.

SO WHY USE A SCOPE?

Relay lenses, bug-eyes and scopes have been around for a long time, and have been used extensively on land for filming and photographing insects, giving the viewer that "bug-eye" view. As a macro photographer, I have lost interest in general black-background macro images and snoot shots. I enjoy shooting low-aperture macro with gorgeous bokeh, but again, the background just becomes negative space. What I enjoy so much about scope shots is that you get pulled into the subject's world, and you see the environment just as much as the macro subject.

ADVANTAGES

• The length of the EMWL means you, your bubbles and "noise" are further away from the subject, and you are not interfering too much or invading their space.

• The small diameters of the EMWL objective lenses allow for shots that would never be possible using a mini-dome.

• You are not stuck with one lens. The EMWL system allows a seamless transition between wide-angle lenses and macro lenses. I generally dive with the 60° and 160° objective lenses. That way, I can shoot the bug-eye images with the 160°, but easily switch to the 60° for super-macro, or the 105mm lens on the camera for standard macro.

LIMITATIONS

It can be quite cumbersome, so make sure you have enough float arms attached to make it neutral underwater.

When changing the lenses in silty conditions, especially at mucky sites like Lembeh, Mabul and Anilao, some sand or silt can get in between the lenses. Nauticam now has a sleeve system to counter this, and it works very well.

Without lens hoods, you will experience some lens flare when shooting towards the sun. The lens hoods remove this but can restrict the minimum distance to the subject. However, I have shaved off the bottom part of my lens hood so I can still get close to the subject, and this does not affect the flare.

Jason's camera setup

< ∧
A hairy frogfish hunting with its lure in Lembeh. Taken with the Nauticam EMWL 160° objective lens

< ∨
A flamboyant cuttlefish about to strike in Lembeh. Taken with the Nauticam EMWL 160° objective lens

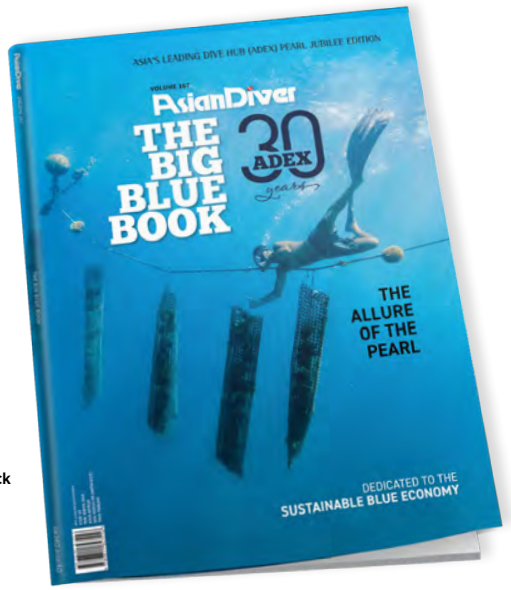
I have now used the EMWL on my D800 in numerous locations, and have also used it on the RED Gemini and Sony FX3 for many film productions soon to be released. It has performed extremely well, and I believe the sharpness and image quality is superior to the LOAWA when used underwater.

LESS DISTURBANCE, MORE ACTION

I have found the marine creatures are definitely less bothered by the small lens, and I even had some octopuses playing with the lens in Lembeh! Sometimes, getting low can be an issue, but Nauticam now has a 45-degree relay lens, which replaces the original straight relay. Having the correct amount of float arms is important to get the balance right, and lighting can be a challenge when focusing at the minimum focus distance, so diffusers on your strobes can definitely help here.

VERSATILITY OF THE EMWL

If you like wide-angle macro then adding the EMWL to your camera gear is a must. The versatility of being able to shoot standard macro, super-macro and macro wide-angle on a single dive certainly makes the purchase worthwhile. I don't think I will ever do a macro dive again without taking the EMWL! AD



ON THE COVER:
Tahitian pearl diver checking on the oysters

Image: **Shutterstock**

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AsianDiver
BY DIVERS, FOR DIVERS

PUBLISHER/EDITORIAL DIRECTOR
John THET *thet@uw360.asia*

EDITORIAL
CONTRIBUTING EDITOR
Ian BONGSO-SELDRUP *ian@uw360.asia*
EDITOR
Sol FOO *sol@uw360.asia*

DESIGN
ASSISTANT ART DIRECTOR
Tinhtwe JUSTIN *tintin@asiangeo.com*

ADVERTISING & MARKETING
REGIONAL BUSINESS MANAGERS
Elysee TAN *elysee@asiangeo.com*
Desmond HO *desmond@asiangeo.com*

PROJECT & EVENTS MANAGER
Ellfrance PHANG *ellfrance@uw360.asia*

MARKETING & EDITORIAL SUPPORT
Mihiri S KORALA *marketing@uw360.asia*

CIRCULATION & PRODUCTION
TRAFFIC/PRODUCTION/CIRCULATION SENIOR MANAGER
Victor OW *victor@uw360.asia*

CONTACT INFORMATION
Editorial Submissions | *editor@uw360.asia*
Photo Submissions | *photo@uw360.asia*
Subscriptions | *subscribe@uw360.asia*
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WRITE TO US
info@uw360.asia
Asian Geographic Magazines Pte Ltd
20 Bedok South Road,
Singapore 469277

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