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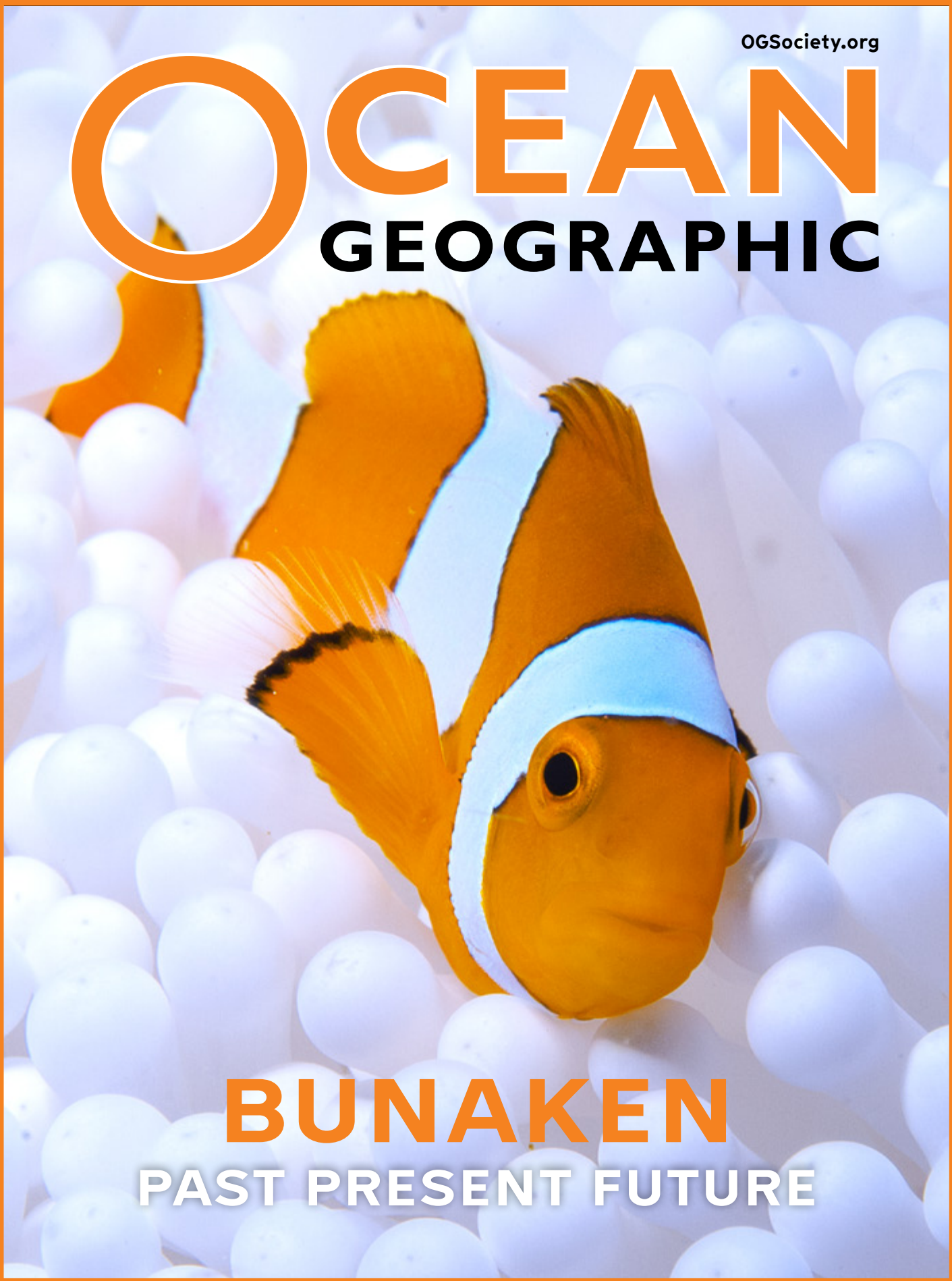

BUNAKEN

PAST PRESENT FUTURE

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ISSUE 62:10/2022
BUNAKEN EDITION


Raffles Oasis

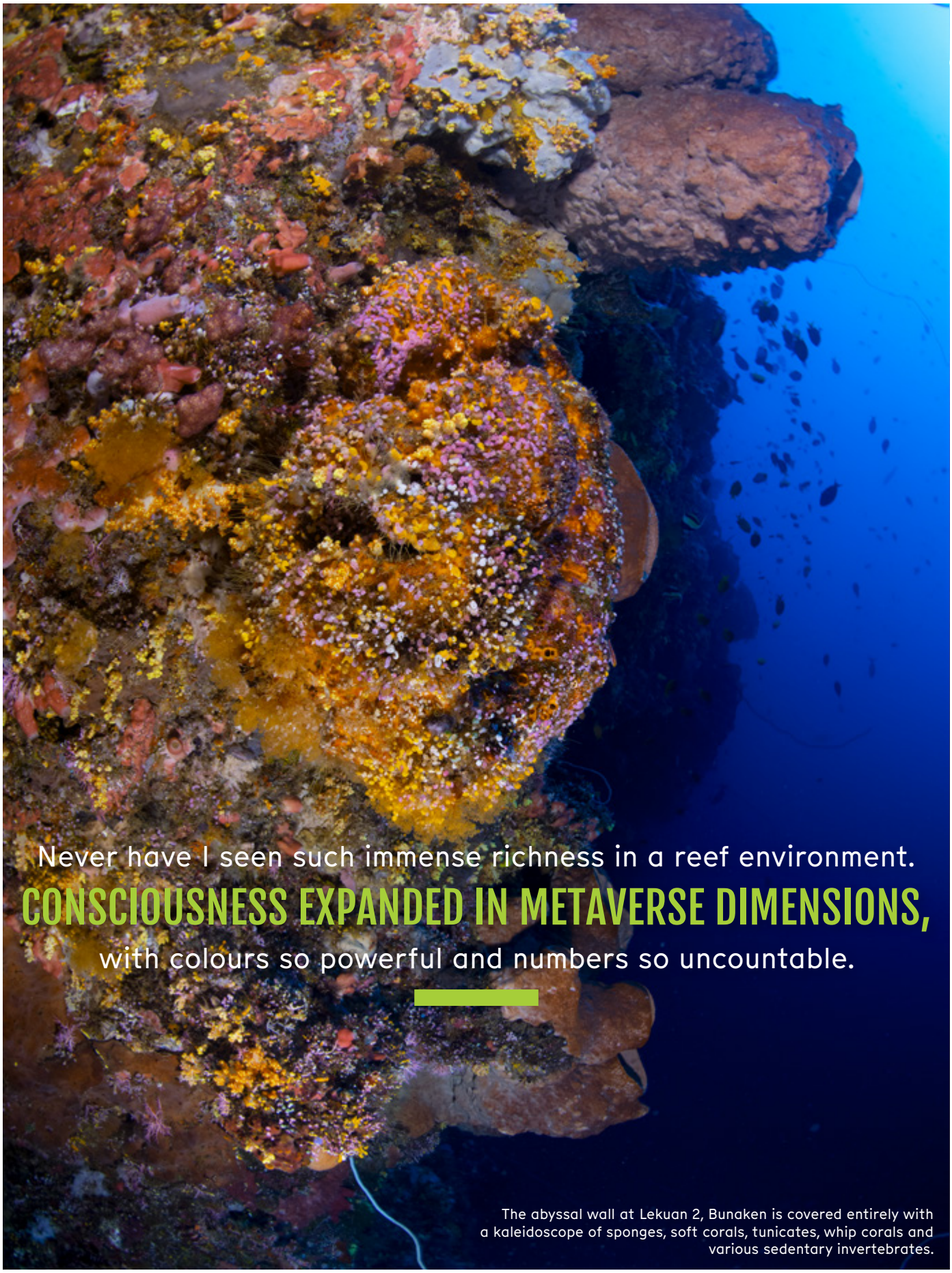
BUNAKEN

Past, Present & Future

ESSAY & PHOTOGRAPHS BY **Michael AW**

Far above the earth, the God of Heaven and of the Sea smiles at one of nature's most wondrous creations: five islands each embracing its fringing reefs and trees that thrive in sea water, bordered with the glistening of black and golden sand beaches.

Beneath Bunaken and Manado Tua Island above.



Never have I seen such immense richness in a reef environment.

CONSCIOUSNESS EXPANDED IN METAVERSE DIMENSIONS,

with colours so powerful and numbers so uncountable.

The abyssal wall at Lekuan 2, Bunaken is covered entirely with a kaleidoscope of sponges, soft corals, tunicates, whip corals and various sedentary invertebrates.

PAST 1992

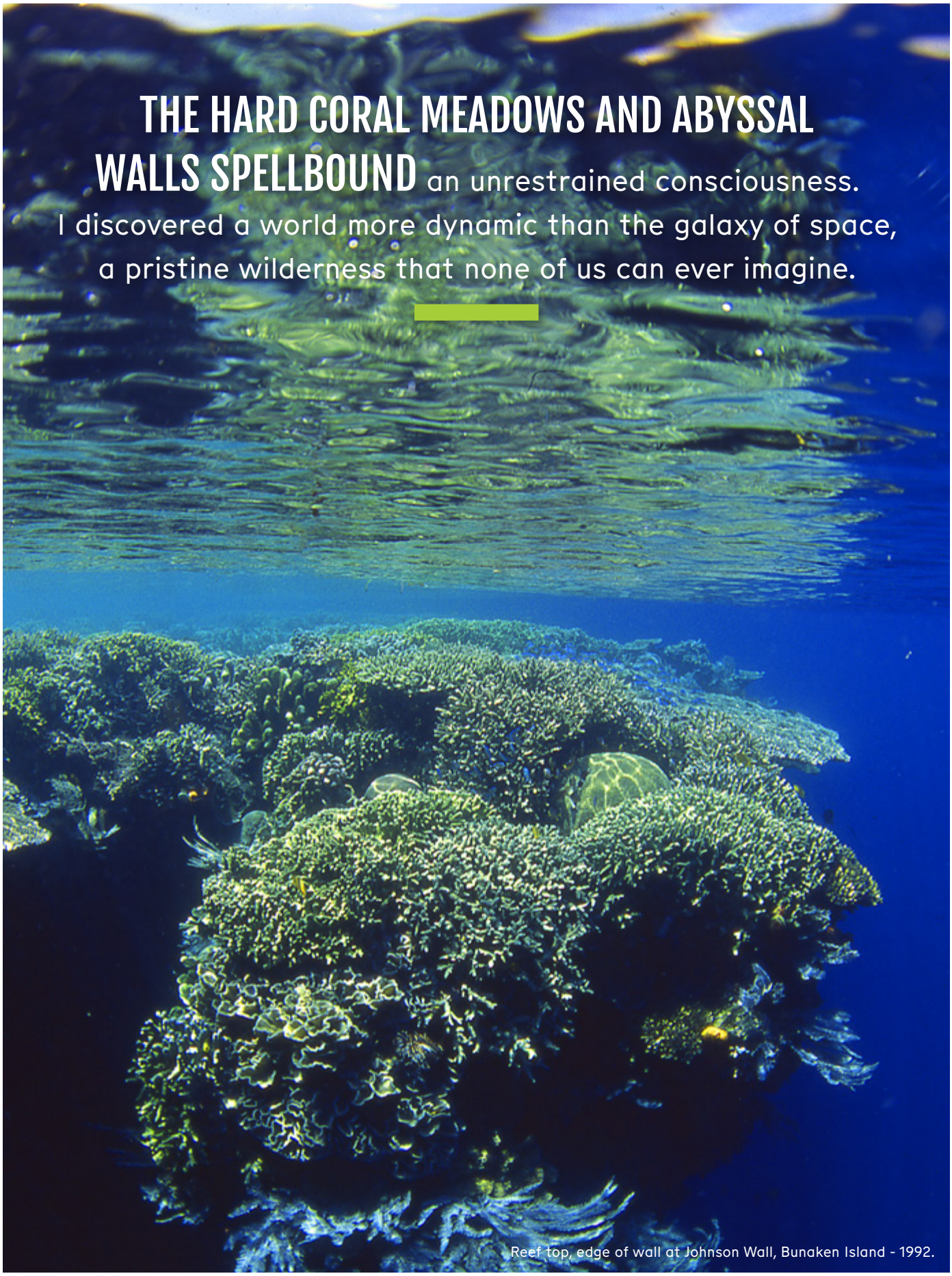
1992 was the first time I explored Bunaken. I was on assignment for GAHAWISRI, the Indonesian Marine Tourism and Watersport Association, to scout for potential locations in Indonesia to open up for marine tourism. Eighteen days prior to arriving in Manado, the gateway town to North Sulawesi, my team and I had surveyed the coral reefs of Ambon and Banda islands. And yet, after just five days of diving Bunaken, I was so overwhelmed, I felt like staying forever I ended up returning to Manado twice in 1992, twice in 1993, and stayed for a total of eight months.

Having roots in Singapore, I am not a coral reef rookie. By 1992, I had dived Similan, Sipadan, Komodo, Bali, Andaman, Ambon, Banda and Australia's Great Barrier Reef. I am not easily impressed, but I was impressed with Bunaken. Clichéd as it may seem, it was love at first sight. My host and guide to the marine park was the local hero and pioneer of North Sulawesi scuba diving, Dr Hanni Batuna, owner of Murex Dive Resort at Kelasey.

I remember vividly the first time I descended the Lekuan walls of Bunaken Island with Dr Batuna. My vision opens to the most diverse life revealing the splendour of the Coral Triangle across an extravagant stage. Never have I seen such immense richness in a reef environment. Consciousness expanded in metaverse dimension, with colours so powerful and numbers so uncountable. The hard coral meadows and abyssal walls spellbound an unrestrained consciousness. I discovered a world more dynamic than the galaxy of space, a pristine wilderness that none of us can ever imagine. Intricacies and a framework of life I have yet to comprehend. Like an inquisitive child filled with wonder, and energy unfelt since adolescence, I was captivated by a multitude of impressions.

Bunaken Manado Tua Marine Park is located about an hour by boat off the shores of Manado. The 75,275-hectare marine reserve is comprised of the islands of Bunaken, Siladen, Manado Tua, Montehage, and Nain. Separated from the mainland by an oceanic trench 1,500 metres deep, frequent upwelling and visitors from the Pacific bring rich nutrients to sustain a copious and lavish coral reef environment. In terms of marine diversity, it is the most prolific of our planet's tropical realms. The reefs here support an array of habitats and species that is unparallel elsewhere! Pods of pilot whales, spinner dolphins and every now and then, orcas are found frolicking within the reserve.

I REMEMBER VIVIDLY the first time I descended the Lekuan walls of Bunaken Island in 1992 with Dr Batuna. My vision opens to the most diverse life revealing THE SPLENDOUR OF THE CORAL TRIANGLE ACROSS AN EXTRAVAGANT STAGE.



Reef top, edge of wall at Johnson Wall, Bunaken Island - 1992.

The range of underwater terrain at Bunaken excite even the most jaded underwater adventurers. From reef flats, reef slopes, caverns, abyssal walls that plummet to abyssal depths. Off the western end of Bunaken Island, a reef slope falls to an expansive deep-water reef that extends to beyond 40 metres. The abyssal walls around Bunaken are adorned with lush coverage of green, pink, purple, and red soft corals, orange sponges, black coral trees, maroon and mustard-coloured sea fans. A phantasmagoria of life in the colours of a rainbow. At about 50 metres, the wall falls precipitously to over 1,000 metres.

Reef top, edge of wall at Lekuan 1, Bunaken Island - 1992.

I am an underwater photographer, you do not have to take my words as gospel; but believe in my pictures. they speak truth. While I was there shooting for my Bunaken project, a scientific survey sponsored by the USAID in 1993, confirmed that most of the reefs in the marine park are comprised of over 80 percent live corals—a very high percentage among other coral reefs. Cumulative research documented over 3,000 species of fishes in the region, compared to 2,000 plus in the Philippines and just over 1,300 in Palau. As the distance from Manado increases, the number of species decreases to as low as 125 at Easter Island in the East Pacific Ocean. The number of endemic species here exceeded those in Philippines and the Australian Great Barrier Reef (White, 1992). A coral biologist from the University of Guam documented over 150 genera of hard corals on Bunaken Island, the signature island of the marine park.

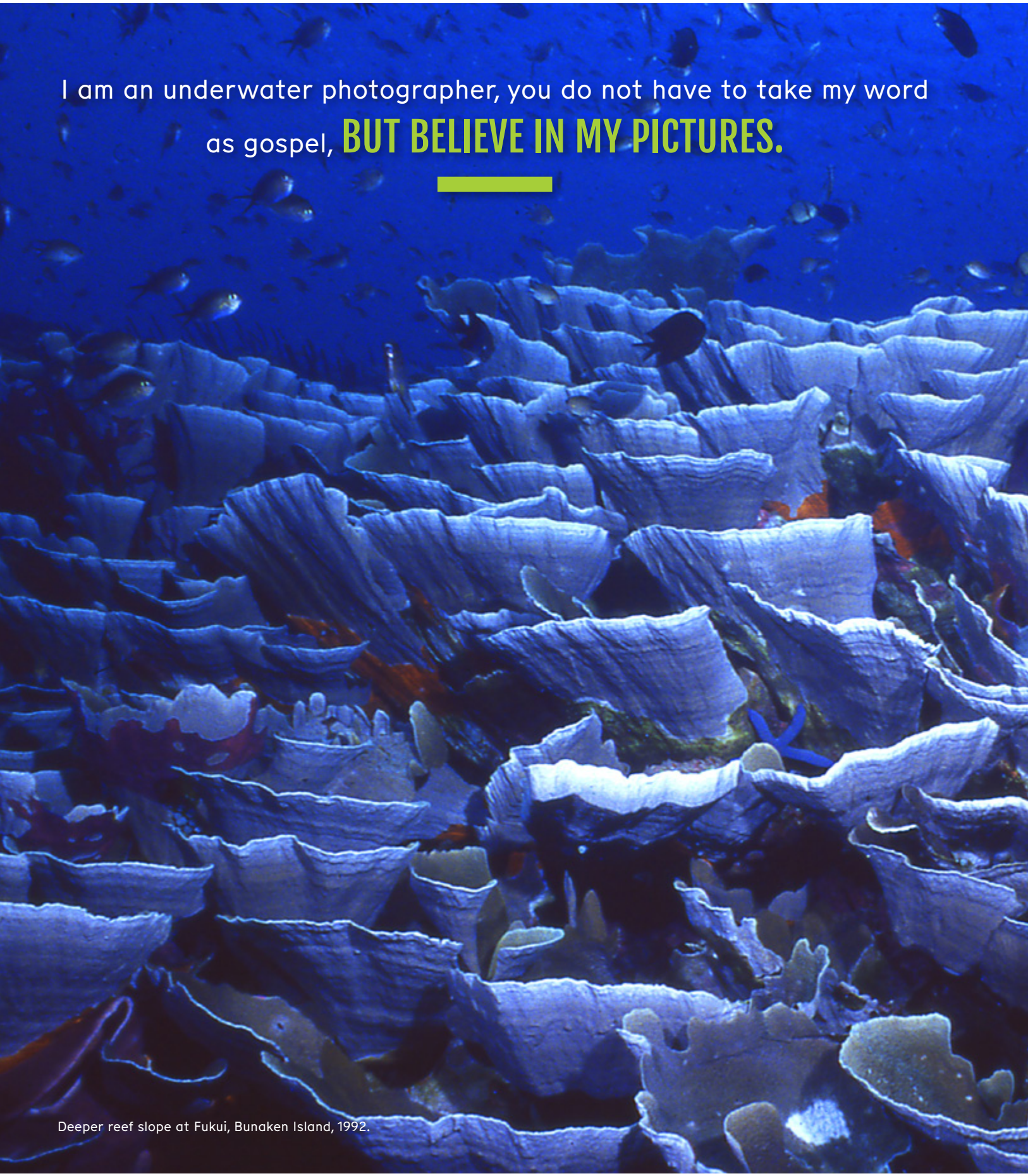
BUNAKEN MANADO TUA MARINE PARK

is located about an hour by boat off the shores of Manado. The 75,275-hectare marine reserve is comprised of the islands of Bunaken, Siladen, Manado Tua, Montehage, and Nain.

During my time there, I was also privileged to have assisted with Dr Carden Wallace AM, then Director of the Museum of Tropical Queensland in her speciation survey of staghorn coral species in the Indo-Pacific. She documented 152 species of Acropora in Bunaken Marine Park, the highest number of this variety of coral on any reef in the world. New species were discovered—the most beautiful was named the *Acropora batunai*[*1] after Dr Batuna. This specie of bottlebrush-like hard coral was found in the protected, shallow reefs of Bunaken and also at depths of up to 44 metres.

By 1993, *Beneath Bunaken* was published, the first coffee table book of the sea for Indonesia. By then, I have called Murex @ Kelasey my second home. As a professional underwater photographer, I am fortunate to have dived the world in the last three decades — from Antarctica to the Caribbean, Australia, Maldives, Galapagos, Cocos, Socorro, Fiji, South Africa and beyond. Though, there are still many places left to venture, Bunaken remains at the top of my list. I have never needed a reason to return. Bunaken was the genesis of my underwater photographic profession.

I am an underwater photographer, you do not have to take my word as gospel, **BUT BELIEVE IN MY PICTURES.**



Deeper reef slope at Fukui, Bunaken Island, 1992.

Bunaken through to 2020

Bunaken has not escaped the problems that plague the world's oceans. The reef is affected by the curse of global warming; bleaching and algae blooms have occurred in passing. With the migration of people into the city of Manado, human and industrial waste in the waterways taint the quality of the sea. Plastic bags and bottles are often seen making a beeline from Manado River to the park. Unsustainable harvesting, including destructive fishing methods such as cyanide and dynamite, were a constant threat, gradually destroying the pristine nature of the park. When I was shooting *Beneath Bunaken* in 1992, there were only three diving operations in Manado. By 1998, there were 15.

Though designated as a national park in 1980, the Minister of Forests only declared it as marine protected area in 1991. As with most marine parks in the region, management and policing did not exist in the early years. Initiatives by a few locals were quickly discouraged by insular politics and a lack of resources.

Fortunately, these matters were addressed with urgency by a few local stakeholders. The North Sulawesi Watersport Association was formed in 1998 with the support of many local resorts. With the efforts of the founding members led by Mark Erdmann and Angelique Batuna, the association successfully set up an entrance fee program to the marine reserve. The funding contributes to park management, policing and education programs for the local children. The efforts paid off—several illegal and destructive fishermen were apprehended and successfully charged. However, disobediance persisted and constant surveillance is costly.

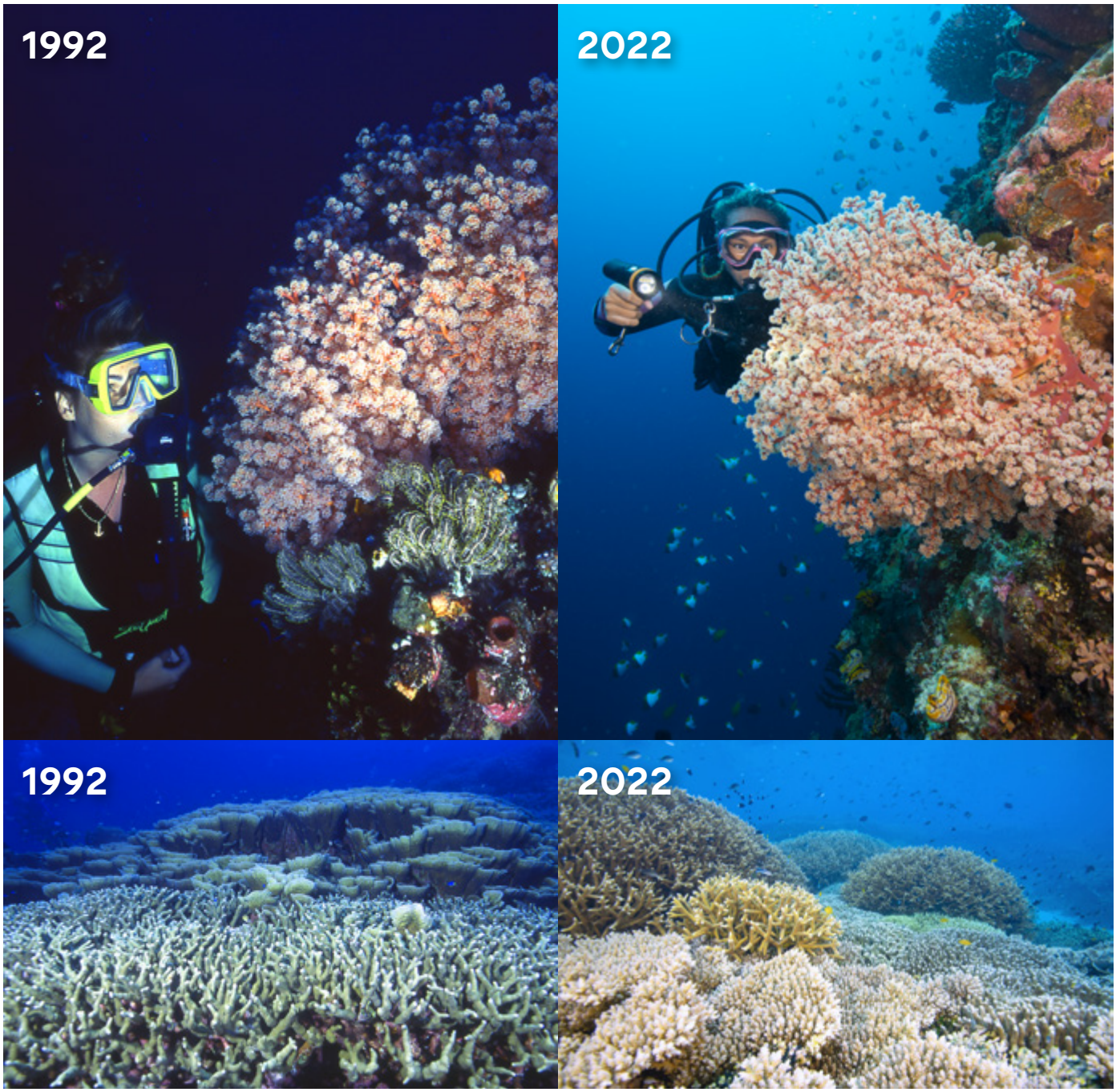
Regardless, in the last 30 years, the variety of life and dramatic seascapes of Bunaken continue to impress, fascinate and every so often, ooze with surprises. In 2006, a new species of weedy pygmy seahorse was discovered by Hentje Pontoh, now a dive guide at Bunaken Oasis Resort. I managed to collect a specimen from the wall of Bunaken Island for Sara Lourie, who named this enigmatic fish, *Hippocampus pontohi,* in 2008. I have often met fellow divers who have travelled to Bunaken several times. Once discovered, the marine park beckons and return becomes a certainty.

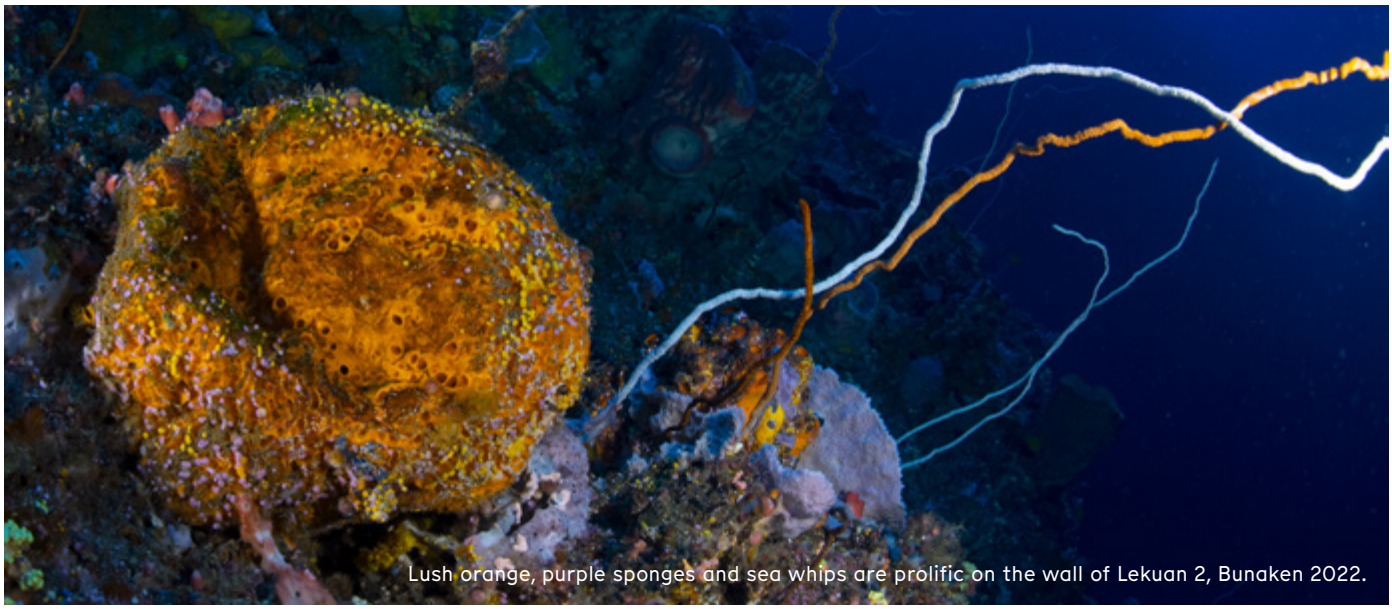
PAST 1992 & PRESENT 2022

In my eight months shooting for *Beneath Bunaken* in 1992 to 1993, I saw a total of three sea turtles.

IN THE FIRST DIVE OF 2022, I STOPPED COUNTING AT 30!

After a week revisiting some of my favourite sites with the guides of Bunaken Oasis, I can conclude that in several aspects, the **CORAL REEFS OF BUNAKEN ARE EVIDENTLY BETTER THAN 30 YEARS AGO.**





Lush orange, purple sponges and sea whips are prolific on the wall of Lekuan 2, Bunaken 2022.

AS I DESCENDED ALONG THE STEEP CLIFF-FACE WALL

at Lekuan Three, a signature site of Bunaken Island, it felt like diving straight into a time machine, taking me back to three decades ago. The wall was covered with an array of sponges, soft corals, sea whips, tunicates, sea fans in its entirety,

SEEMINGLY MORE ABUNDANT THAN I REMEMBERED.

Black corals and tube sponges adorn the wall of Lekuan 3, Bunaken 2022.

PRESENT 2022

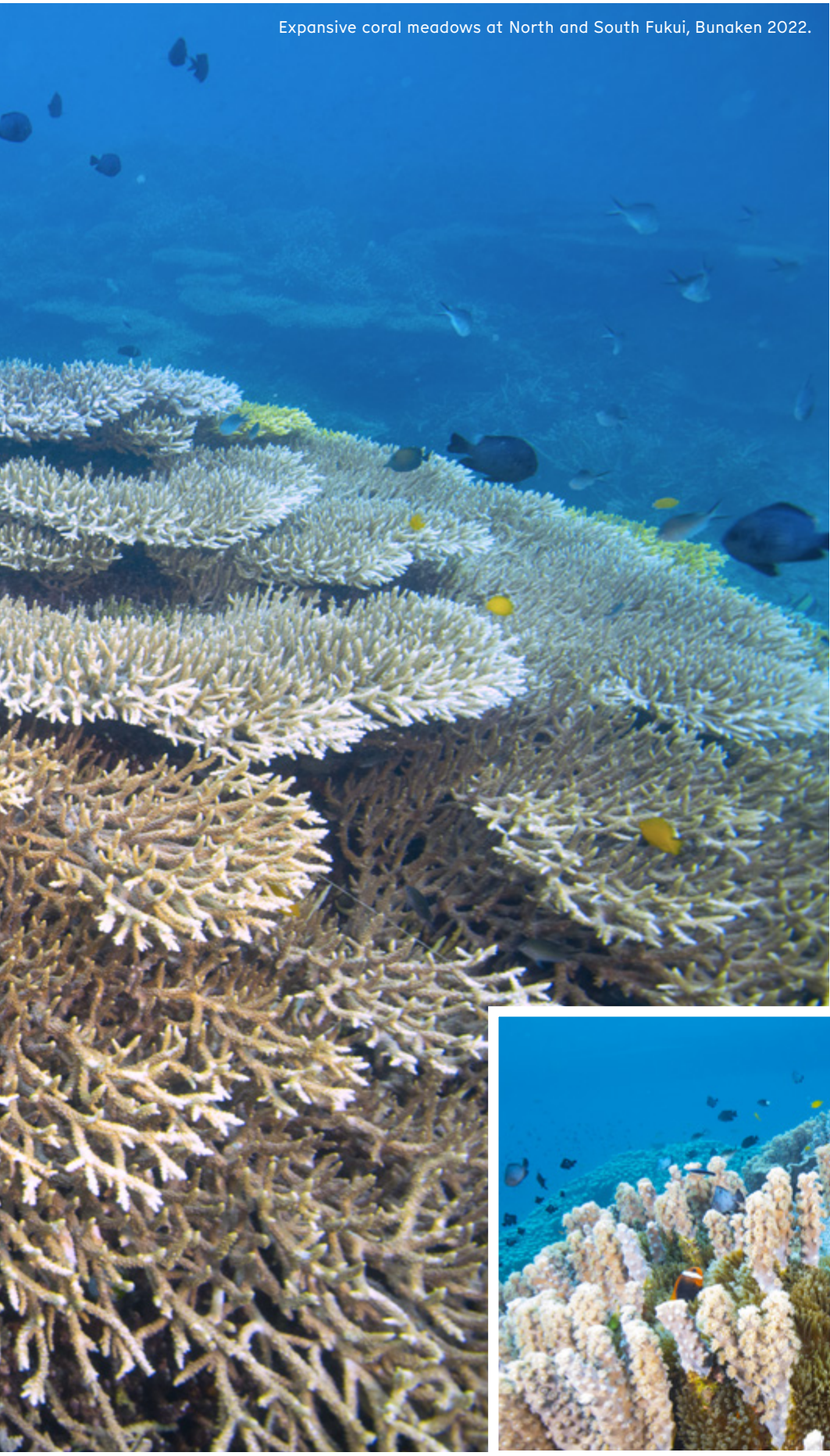
2022: During the global pandemic, like the rest of Indonesia, Manado was closed to international tourists for over two years. Once alerted of the lift on entry restrictions in late March 2022, I was immediately keen to check out the health of the reefs at Bunaken. After two years of respite from divers and snorkellers, did the reef environment benefit from the Covid-19 restrictions? For ease of access, I arranged with Georgie Barlett to stay at Bunaken Oasis Resort — this environmentally sustainable operation is located right in the heart of Bunaken Island. On 13 April, I was the first permitted to enter Manado with the ease of Visa on Arrival entry into Indonesia.

First light seen from the thatched villa at Bunaken Oasis was a surreal experience. My view of Manado Bay at half-past six was of a dark sapphire sky with streams of galactic rays showering down upon a mirror-flat sea. Almost impalpable to the eyes, the horizon began to exhale an ethereal warmth. Within minutes, the indigo sky melted into an orange-yellow blaze. Almost abruptly, the sun rose and burst into the life upon the reefs. A good omen for a great day of discovery.

As I descended along the steep cliff-face wall at Lekuan Three, a signature site of Bunaken Island, it felt like diving straight into a time machine, taking me back to three decades ago. The wall was covered with an array of sponges, soft corals, sea whips, tunicates, sea fans in its entirety, seemingly more abundant than I remembered.

This Tridacna giant clam at Fukui is alive and well—it is over 30 years old. 2022.

A recent NOAA/UN report suggests that more than 90 percent of remaining reefs will be threatened by 2030 and nearly **ALL REEFS WILL PERISH BY 2050 UNLESS DRASTIC ACTION IS TAKEN NOW TO REDUCE THE THREATS.**



Expansive coral meadows at North and South Fukui, Bunaken 2022.

There is one huge difference. In my eight months shooting for ***Beneath Bunaken*** in 1992 to 1993, I saw a total of three sea turtles. In the first dive of 2022, I stopped counting at 30! Mostly Green, but a few Hawkbill turtles were found resting on every other ledge, overhangs, on sponges, coral trees, on reef flats, and every so often, I see them swimming up to the surface or returning from a breather. The hard coral meadows seem denser and more expansive. I can say with confidence that the density of sedentary invertebrates on the walls of Bunaken are the most prolific of our planet's ocean realm.

After a week revisiting some of my favourite sites with the guides of Bunaken Oasis, I can conclude that in several aspects, the coral reefs of Bunaken are better than 30 years ago. Even the mangrove coverage around the island is noticeably thicker. While coral reefs around the world have deteriorated and some completely disseminated, Bunaken is perhaps the only known coral reef that is healthier than before. Incidentally, I am an underwater photographer with pictures to support my statements.

Expansive mangrove forest extend along the entire coast of Bunaken Island 2022.

FUTURE

2052 - The future is grim. Coral reefs are now declining at twice the pace of rainforests. Coral reefs face serious threats of rising sea temperature, pollution, and overfishing. Our planet has lost 50 percent of its coral reefs in the last 50 years. A recent NOAA/UN*[2] report suggests that more than 90 percent of remaining reefs will be threatened by 2030 and nearly all reefs will perish by 2050 unless drastic action is taken now to reduce the threats.

Australia's Great Barrier Reef, has lost half of its reef-building corals from 2015 to 2020. As the oceans heat further and turn more acidic, due to rising carbon dioxide emissions, coral reefs will become the world's first ecosystems to become extinct as a direct result of human activities.

In a 2018 report, the Intergovernmental Panel on Climate Change predicted that 1.5°C of global warming would cause between 70 and 90 percent of the world's coral reefs to disappear. At the current trajectory, our planet is projected to reach 1.5°C of warming in the early 2030s. Without transformative action to reduce GHG emissions, 99 percent of the world's reefs will experience heatwaves that will be too damaging for any hope for recovery. This cast a catastrophic scenario for tens of thousands of species that depend on coral reefs, as well as the roughly one billion people whose livelihoods and food supply benefit from coral reef biodiversity. Expand that out to 2100 and it's "looking quite grim," says Renee Setter, a marine scientist at the University of Hawaii in Manoa. At current trajectory, by 2100 there will be nearly zero suitable coral habitats remaining, eliminating nearly all living coral reef habitats.

Nowhere else in the terrestrial world can we float weightlessly and watch the eccentricity of nature's greatest magic right before our eyes. So, are we going to just sit by the wayside and just watch our natural heritage dissipate into nothingness? Are we going to deprive future generations of enjoying the wonders of nature beneath the surface of the sea? I hope not. I am a believer. I believe that we can preserve our coral reefs. **OG**

Even the mangrove coverage around the island is noticeably thicker. While coral reefs around the world have deteriorated and some completely disseminated,

BUNAKEN IS PERHAPS THE ONLY KNOWN CORAL REEF THAT IS HEALTHIER THAN BEFORE.

At current trajectory, **BY 2100 THERE WILL BE NEARLY ZERO SUITABLE CORAL HABITATS** remaining, eliminating nearly all living coral reef habitats.

Healthy deep reef at Fukui, Bunaken Island 2022.

Aerial view of Fukui, Ron Point, Mandolin at Bunaken Island, Montehage and Nain Islands in the distance.

Murex Resort 1992.

Bunaken Oasis Resort 2022.

Nowhere else in the terrestrial world can we float weightlessly and watch the eccentricity of nature's greatest magic right before our eyes. **SO, ARE WE GOING TO JUST SIT BY THE WAYSIDE AND JUST WATCH OUR NATURAL HERITAGE DISSIPATE INTO NOTHINGNESS?**

10 WAYS you can help save coral reefs and a habitable planet for the future of your loved one.

- Be a voice for coral reefs – share pictures, story with friends, families and on your social media platforms.
- Encourage friends and families to snorkel or scuba dive. Visit coral reefs often.
- Educate yourself and everyone on the importance of our ocean.
- Stop or Reduce consumption of sea life.
- Take ownership of your carbon footprint – reduce and offset.
- Support businesses and leaders with strong sustainable policies.
- Use reef-safe sun screen.
- Volunteer for beach and reef clean-ups.
- Volunteer and support NGOs that are active in coral reef preservation.
- Stop the use of single-use plastic.

Editor's Note: The author wishes to convey immense thanks to the owner and staff of Murex Dive Resort Manado for supporting his early work in Bunaken, especially for the production of 'Beneath Bunaken' from 1992 to 1993. Michael is also grateful for the support of Bunaken Oasis Dive and Spa Resort for supporting the post-covid rapid assessment in 2022.

*[1]Acropora batunai is rated as Vulnerable species on the IUCN_Red_List, with a decreasing population, and is extremely fragile.

*[2] https://unesdoc.unesco.org/ark:/48223/pf0000265625

Reef Health Check Project

Bunaken North Sulawesi Coral Reef Rapid Assessment

18 – 29, July 2022

REPORT BY Dr Paul Muir, Vincent Chalais, Andrew Charlton

Rapid coral health assessment at Bunaken conducted by Dr Paul Muir and team. Photograph by Renee Capozzola

The assessment surveys were conducted using SCUBA at 22 sites in the Manado/Bunaken area in mid-2022, to determine coral diversity and reef condition (Figure 1). *Acropora* and *Isopora* are the dominant coral genera on most healthy reefs across the Indo-Pacific (and once the Caribbean), but many of the species are rare and threatened (IUCN, 2022). *Acropora* is also a good early indicator of reef stress. We therefore concentrated our efforts on these species, revisiting sites used in the early 1990s for a study of *Acropora* in the area by Dr Carden Wallace. Dr Wallace discovered several new *Acropora* species that are unique to this area and very rare, with a high conservation value.

We found 81 *Acropora* species in the Bunaken/Manado area, including several considered very rare and potentially endangered (Table 1). Dr Wallace found 79 species in her 1990/92 surveys and we located all but two of these species. We also detected two additional rare *Acropora* species that were not recorded by Dr Wallace. Some of these variations may be due to differences between the two studies, but it would be worthwhile to follow up on the missing species.

Several of the *Acropora* species we found are considered internationally to be at a high risk of extinction, due to their small population size and very restricted distribution (IUCN 2022). Many of the

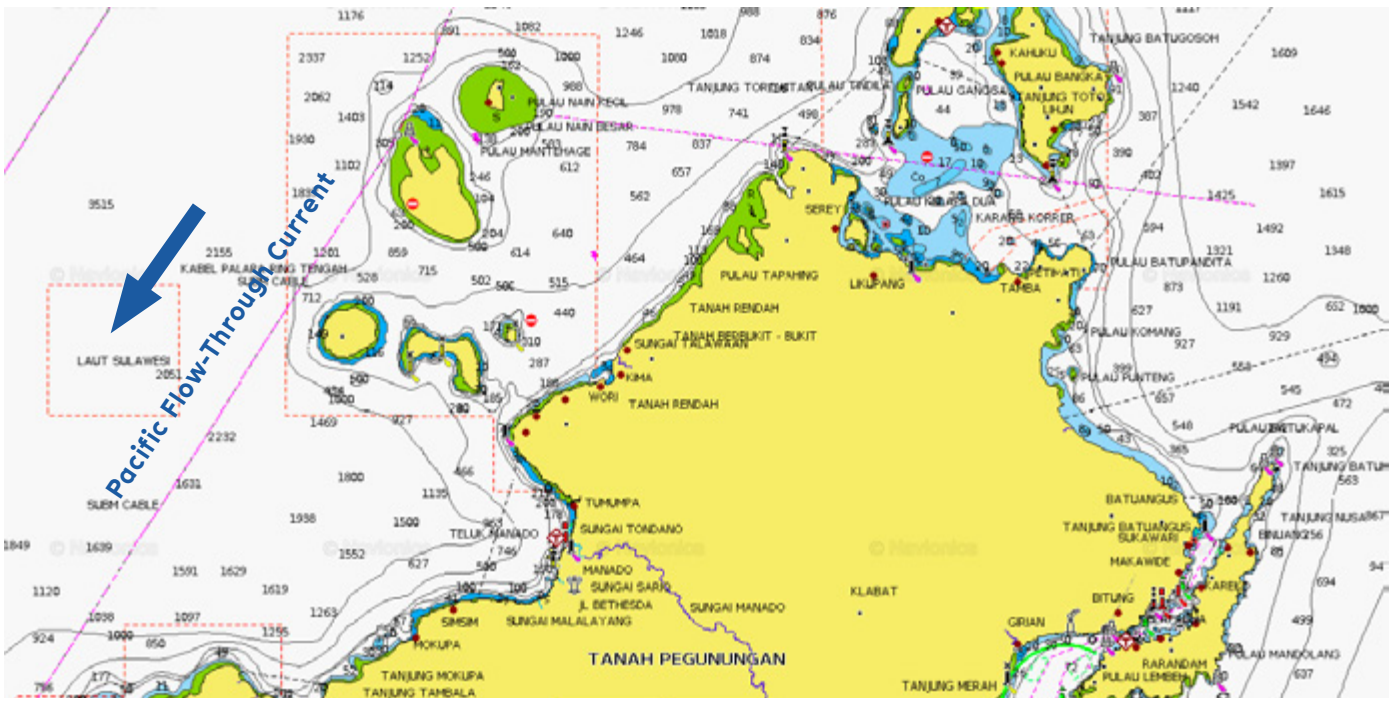


Figure 1. Sites sampled in the Bunaken/Manado Area in 2022. Water depths shown in meters.

At each site, we identified the *Acropora*/*Isopora* species present and estimated their abundance. We also estimated the abundance of other coral genera and noted unusual species. Approximately 1,500 high-resolution images were taken as proof of identity and to identify corals that could not be identified in situ. These images are still being analysed in consultation with Dr Wallace and our analyses are not yet complete, but here we describe our initial findings.

species we found occur only in the "Wallacea" area around N. Sulawesi. It is encouraging that after 30 years with increasing human impacts in the Manado area and a rise in global threats to reefs, that these species were still present. Although, it is concerning that several of these species had a very low population, some with only 1-2 individuals detected across all our sites (Table 1). These population sizes may not be sustainable and these species are possibly at a high

risk of extinction, although further studies in neighbouring reef areas would be required to properly assess this risk. Hard corals are the key foundation species of reefs, so that their loss could have significant knock-on effect on a large number of other reef species.

Results for some of the other *Acropora* species were also of concern: *A. hyacinthus* is a table coral normally very common on healthy reefs across the Indo-Pacific. However, we found only very low numbers of this species. *A. hyacinthus* is vulnerable to human impacts and is often one of the first species to decline on stressed reefs. We also noted other usually common species (e.g. *A. robusta*, *A abrotanoides*) were also rare or missing from many sites.

The condition of the reefs was good at many sites, with up to 90 percent living hard coral cover (Table 1). This is somewhat surprising, given their proximity to the large population at Manado. We also found no sign of mass mortality or mass bleaching events and reports from local divers suggested mass bleaching had not occurred in the area.

Acropora jacquelinnae, a rare species found in very low numbers.

THE REEFS AROUND BUNAKEN COULD WELL BECOME A REFUGE

for many reef species in the future as mass bleaching events become more severe across the rest of the world.

Location	Site	Shallow	Deep
Bunaken	Fukui (North)	30-50%	10-30%
Bunaken	Lekuan 3	30-50%	10-30%
Manado	Batas Kota Timor	10-30%	10-30%
Lembeh	California Roll	30-50%	10-30%
Lembeh	Nudi Falls	0-10%	30-50%
Lembeh	Makawide3	30-50%	10-30%
Lembeh	Pantai Parigi	30-50%	10-30%
Bangka	Lihunu	50-70%	10-30%
Bangka	Minpi Indah	0-10%	70-90%
Bangka	Tanjung Usi	30-50%	0-10%
Bangka	Tarabitan Bay	10-30%	0-10%
Bunaken	Mike's point	10-30%	0-10%
Bunaken	Raymond	70-90%	10-30%
Bunaken	Bunaken Lagoon	10-30%	10-30%
Bunaken	Fukui (South)	50-70%	30-50%
Bunaken	Cela-Cela	30-50%	10-30%
Siladen	Kalumpang	30-50%	10-30%
Siladen	Siladen jetty/wall	10-30%	0-10%
Manado	Critter Cirdus	0-10%	0-10%
Manado	Poppo 1	0-10%	0-10%
Manado	Loboloco	50-70%	10-30%
Manado	Mutiara	50-70%	10-30%

Table 1. Sites sampled and preliminary estimates of living coral cover.

While many of the reefs were in good condition,

SEVERAL SITES SHOWED DECREASED CORAL COVER, DISEASE, INCREASED COTS AND *DRUPELLA* AND OTHER SIGNS OF STRESS AND DECLINE.

The lack of larger fish was also of concern as overfishing exacerbates COTS, *Drupella* and macro-algae.

THE CONDITION OF THE REEFS WAS GOOD at many sites, with up to 90 percent living hard coral cover. This is somewhat surprising, given their proximity to the large population at Manado.

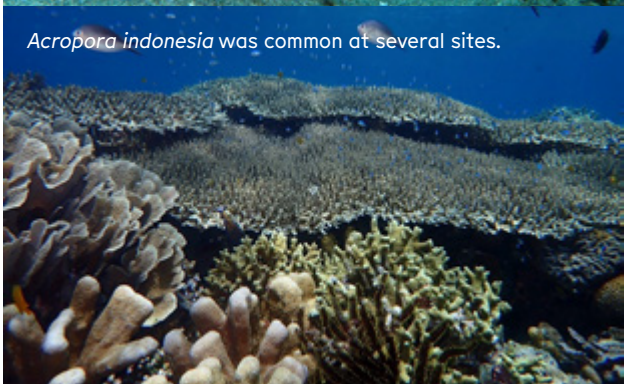
This is quite unusual: mass bleaching has affected most reef systems across the Indo-Pacific in recent years. These events are caused by unusually warm water pooling over large areas of reef for weeks at a time. In the Bunaken area, the presence of very deep channels (up to 1.5 kilometres) and the strong currents may prevent this warm water pooling. The Pacific flow-through is a strong oceanic current that runs through this area from north to south (Figure 1); its deep, cool waters were often evident at the sites and could provide a strong protective effect. This is a very unusual feature and time will tell just how protected this area is from mass bleaching. The reefs in this region could well become a refuge for many reef species in the future as mass bleaching events become more severe across the rest of the world.

The deep-water channels and strong currents would also provide some protection from the impacts of sewage and increased sediment runoff from the Manado population, thus explaining the good condition of many of the reefs. Sediments from development and mining and the nutrients from sewage and agricultural runoff normally have a severe effect on nearby reefs. Excess nutrients and sediments reduce water clarity and light available to corals, also causing outbreaks of disease, crown of thorns starfish (COTS), *Drupella sp.* snails and macro-algae. The deep water and strong currents probably carry some of the nutrient and sediment pollution away from the Bunaken reefs. However, this protection appears only partially effective. While many of the reefs were in good condition, several sites showed decreased coral cover, disease, increased COTS and *Drupella* and other signs of stress and decline. The lack of larger fish was also of concern as overfishing exacerbates COTS, *Drupella* and macro-algae.

Also of note were some extraordinary reefs along the Manado shoreline (e.g. "Lobo Loco", Table 1), dominated by the largest colonies of *Lobophyllia* species the authors have seen. Some of the very rare *Acropora* species were only noted in these areas. One of the missing rare species, *Acropora multiacuta*, was last recorded in the area in 2015 (by Vincent Chalais), but this reef has now been destroyed by reclamation. Reclamation is ongoing and threatens to devastate the remaining reefs, which are unique and in urgent need of protection.

While these are early results, there are clearly areas of concern. The Bunaken/ Manado area has had a great advantage in terms of global impacts, but local impacts are beginning to show. These local impacts will negate any advantages unless controlled.

The rare species *Acropora batunai*, a new record for the Bunaken area.



Acropora indonesia was common at several sites.

Addressing the local threats could include:

- Regular measurement of living coral cover to detect early changes and possible causes.
- Monitor populations of rare corals, with local and tourist divers.
- Check for local nutrient and sediment inputs; poorly functioning treatment systems can leak nutrients into the groundwater and damage adjacent reefs.
- No-take zones to improve fish populations; these can be a "win-win", actually increasing overall catch.
- Manual removal of COTS and *Drupella.*
- Highlight the value of the inshore *Lobophyllia* reefs before reclamation projects destroy them.
- Surveys of the surrounding area, including Bay of Tomini to determine the overall population size of these unique and threatened foundation species.
- Ultimately, proper sewage treatment, no-take zones, a ban on single use plastics and control of reclamation would protect these reefs properly.

Bunaken North Sulawesi Coral Reef Rapid Assessment 2022 is sponsored in part by Ocean Geographic. Championed by Danny Charlton with generous support from Murex Dive Resort Manado & Bangka, Lembeh Resort, Lumba Lumba, Siladen Dive Resort, Peninsula Hotel and Bunaken Oasis Resort.