

ecology

Leopard shark released into the wild after being raised in the ReShark programme in Raja Ampat

Text by Don Silcock
Photos courtesy of Mark Erdmann

Raja Ampat in Indonesia is now recognised as the epicentre of biodiversity on the planet. However, its conservation has been 20 years in the making. A key figure in its development and strategy is ecologist Mark Erdmann. Don Silcock has the story.



Coral reef ecologist Mark Erdmann, Vice President of Asia Pacific Marine Programmes for Conservation International



Conservation in **Raja Ampat** *Mark Erdmann & A Holistic Strategy*

In just over 20 years, Raja Ampat, the “Four Kings” of Indonesia’s remote West Papua province, has evolved from an almost unknown location into one of the world’s most sought-after tropical diving destinations. Back in 2005, when I first visited the area, diving options were limited to just a few liveaboards

and a couple of land-based “eco” resorts—essentially beach camps.

Today, at the height of the main diving season, nearly 100 boats operate in the area, and land-based accommodation ranges from basic village homestays to high-end luxury resorts. While much has changed, some things

remain beautifully constant—starting with the stunning landscape, which is as picturesque as ever.

And underwater, Raja Ampat’s renowned biodiversity is as vibrant today as it was during my first dive nearly two decades ago. Not only has this biodiversity been preserved,

but top predators are making a strong comeback. In 2005, shark sightings were rare. Now, they are relatively common at many of the main dive sites. Similarly, encounters with both reef and oceanic manta rays have increased significantly, making Raja Ampat one of the few places world-





Erdmann in the field to survey the reefs of Raja Ampat (above) and in Indonesia in the early days (right)

wide where manta ray populations are actually growing.

The changes above the water are just as striking. Upon arrival in Sorong, you are greeted by a modern airport that has replaced the run-down and dilapidated original. The city itself has grown significantly due to domestic “transmigrasi” and now boasts several department stores, shopping malls and a range of decent hotels.

So, how is it that so much growth has taken place and yet the environment and biodiversity have been largely protected while specific areas of concern have been addressed? After all, Indonesia has long struggled with a poor environmental reputation, yet this remote outpost of

the archipelago has become a shining example of broad-based, proactive conservation that has “lifted the boat” and all those in it!

Many people, both Indonesians and foreigners, have played crucial roles in this remarkable story. But a handful of key figures have done much of the heavy lifting. Over the last few years, I have had the privilege of getting to know some of these people, and I have been deeply inspired by the stories behind Raja Ampat’s conservation success. It starts with Mark Erdmann, whose deep understanding of marine ecosystems is matched by a similar understanding of Indonesian culture and politics, fluency in Bahasa and an

incredible ability to explain, motivate and get things done!

Who is Mark Erdmann?

Erdmann is an American coral reef ecologist with a Ph.D. from the University of California, Berkeley. Currently based in Auckland, New Zealand, where he moved in 2014 with his wife, Arnaz, and their children, Erdmann spent the previous 23 years living in Indonesia, where his connection to the region’s marine ecosystems began. He is Vice President of Asia Pacific Marine Programmes for Conservation International, where he provides strategic guidance, technical expertise and fundraising support to Conservation International’s



marine initiatives across the Asia Pacific region, with a particular focus on West Papua and New Zealand.

Erdmann’s fieldwork is extensive, and he has logged over 14,000 dives surveying marine biodiversity throughout the region. His efforts have led to the discovery and description of 215 new species of fish, mantis shrimp and corals. An accomplished author, he has published 261 scientific articles and six books, including the recently updated three-volume series *Reef Fishes of*

the East Indies, 2nd Edition, co-authored with Dr Gerald Allen.

The first trip

Erdmann first set foot in Raja Ampat in 2002 as part of a small Nature Conservancy (TNC) expedition tasked with validating a Conservation International report identifying the region as the global epicentre of marine biodiversity. Guided by Max Ammer, the pioneer of diving in Raja Ampat, within just a few dives, Erdmann confirmed this lofty claim in his own area of exper-

RAJA AMPAT BIODIVERSITY

“Raja Ampat and the Bird’s Head Peninsula harbour an astonishing percentage of the Earth’s coral reef biodiversity. With almost 600 species of hard coral, this region alone is home to roughly 75 percent of the world’s hard coral species. The need to protect and manage this biodiversity is imperative.

“We hypothesise that the area functions as a ‘species factory’, an active cauldron of evolution where novel biodiversity continues to emerge. This diversity forms the building blocks for adaptation to all manner of global changes, including, of course, climate change.

“Maintaining it is essential for giving coral reefs, and by extension, humanity, the best chance to survive the environmental challenges facing our planet. If the Bird’s Head is not properly managed, we risk losing this invaluable repository of biodiversity.”

— Mark Erdmann







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WHY CONSERVATION IS IMPORTANT IN RAJA AMPAT:

"The incredible biodiversity of Raja Ampat and the Bird's Head Peninsula is now well-known. However, much less well-known is the critical role this diversity plays in enabling adaptation to ongoing changes in our oceans.

"Proper management of this region offers additional bene-

fits beyond biodiversity preservation. The Bird's Head serves as an 'incubator' for testing innovative conservation strategies, such as heavily investing in empowering local communities to manage their own resources on a large scale.

"Besides serving as a management 'classroom' (the lessons learned from which are now being shared around Indonesia), Raja Ampat's

position at the top of the 'Indonesian Throughflow' of waters from the Pacific towards the Indian Ocean means that having healthy populations of reef fishes and other organisms here can actively 'seed' other reefs in eastern Indonesia due to the strong currents passing through Raja Ampat and towards the Maluku spice islands."

— Mark Erdmann



Erdmann and Dr Gerry Allen have worked together since 2005 when Allen joined the Conservation International team as Science Team Leader for marine conservation surveys after serving as Senior Curator of Fishes at the Western Australian Museum in Perth.

tise—mantis shrimp (stomatopods). Over the following years, he documented 56 species of reef-associated mantis shrimp in Raja Ampat, establishing it as the most diverse marine area for these creatures in the world.

However, that initial trip also revealed to him that, rather than the pristine wilderness it first appeared to be, Raja Ampat's biodiversity was, in fact, facing significant threats from blast and cyanide fishing, shark finning and turtle poaching. By the end of the trip, two things were crystal clear to Erdmann: Firstly, urgent conservation efforts were needed to protect the unique marine environment he had seen, and secondly, he had found his calling!

The challenge

The magnitude of the challenge Erdmann faced back then is daunting and difficult to comprehend from today's perspective—but let's start with some basic facts.

Raja Ampat was a very remote area with a unique and highly refined culture that was largely undocumented and often misunderstood. At the same time, the region was under intense pressure from greedy outsiders exploiting its resources with little regard for the long-term consequences.

The obstacles were also formidable—minimal infrastructure, significant logistical difficulties and an almost total lack of enforcement capacity—all of which compounded the threats

to Raja Ampat's biodiversity. Yet, the situation was not hopeless. If enough funding could be secured, these challenges would be solvable. But where would the financial support come from, and how could it be used effectively to create sustainable, long-term solutions?

First principles

In 2004, Conservation International recruited Erdmann to help develop and advise on its Raja Ampat marine conservation programme, providing him with the perfect platform to immerse himself in Raja Ampat's extraordinary marine ecosystem.

Erdmann recognised that comprehensive data on Raja Ampat's marine biodiversity would be crucial for rallying sup-

port from influential stakeholders and securing the funding needed to sustain lasting conservation efforts. Gathering this data would require two essential elements: identifying the full range of fish and coral species in Raja Ampat and documenting new species discoveries.

But physically counting fish species in the dynamic and ever-changing environment of a thriving coral reef was nearly impossible. Discovering new species presented further challenges, often demanding exploration at depths far beyond recreational diving limits. Somewhat unexpectedly, it was in the wake of the catastrophic Boxing Day (Sumatra-Andaman) tsunami of 2004 that Erdmann encountered



Erdmann on a safety stop during a survey of the reefs in Raja Ampat

the person who would help him overcome these obstacles.

In early 2005, Conservation International assigned Erdmann to the team assessing tsunami damage to the reef systems around Weh Island in Sumatra, close to the earthquake's epicentre. There, he teamed up with renowned ichthyologist Dr Gerry Allen, who had joined Conservation International as Science Team Leader for marine conservation surveys after serving as Senior Curator of Fishes at the Western Australian Museum in Perth.

Allen was extremely knowledgeable about fishes and their habitats, with nearly 40 years of

academic and field experience at the time. Most importantly for Erdmann, Allen brought with him a way to accurately estimate the number of fish species on a given site—the Rapid Ecological Assessment (REA). The two clicked instantly, forging a partnership that has spanned nearly 20 years and yielded remarkable results—not least of which is the foundational data on which Erdmann would base Conservation International's Raja Ampat conservation strategy.

The numbers

Often working together as a two-man survey team, Allen and

Erdmann focus on specific depth zones to maximise their coverage of fish species in each targeted location. Allen typically surveys the shallower depths, down to around 40m, while Erdmann explores the deeper 40-70m range. He then spends his often-considerable decompression time focusing on counting dwarf gobies and other cryptic reef fishes in the shallows.

The numbers produced from these initial baseline surveys, and the numerous others that have followed, are quite amazing—with over 1,660 species of reef fish and 574 species of coral identified. In addition, more than 70 species of reef



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Erdmann, who is fluent in Bahasa, and his team worked to empower local communities to manage marine protected areas and secure their own food resources for the future.



fish, corals and crustaceans endemic to Raja Ampat and the broader Bird's Head Seascape of West Papua have been identified—which is how the area earned its “species factory” moniker.

A holistic strategy

Armed with data confirming that Raja Ampat was indeed the global epicentre of marine biodiversity, Erdmann set to work with a top-notch team of Indonesian marine conservationists on an overarching conservation strategy. While the approach had many facets, one word best encapsulates it: holistic.

By this time, Erdmann had lived in Indonesia for around 14 years and was fluent in Bahasa, which helped him navigate the often nuanced and opaque processes of local governance. With Indonesia's Javanese-centric central government based in Jakarta and

multiple districts (kecamatan) in Raja Ampat Regency, achieving consensus across various governmental departments definitely required a nuanced approach.

Erdmann and his highly dedicated Indonesian team succeeded by grounding Conservation International's strategy in data, using biodiversity figures as a catalyst for action. Equally essential to the strategy was to ensure that the needs and priorities of Raja Ampat's local Papuan communities were central to the initiative.

These communities, rooted in Melanesian culture, have a strong tradition of marine tenure, which encompasses not only the land and reefs but also the resources within those reefs. Erdmann and his team knew that while the Papuans might take pride in being custodians of the world's most biodiverse reefs, their primary con-

cern was securing their food resources in the face of outside fishing pressure.

Thus, when the idea of a marine protected area (MPA) network was introduced, it was not framed merely as a way to protect biodiversity. Instead, the MPAs were presented as legal tools to reinforce the Papuans' marine tenure rights, strengthening their claim to the reefs and safeguarding the marine resources critical to their communities.

Skin in the game

Erdmann and his team understood that empowering local communities to manage the MPAs would be essential to the long-term success of conservation efforts. They worked closely with the Raja Ampat government to implement a groundbreaking model of local MPA management, wherein communities defined their MPA boundaries, set the rules

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Erdmann on location in Raja Ampat. Biodiversity data collected in the field was used as a catalyst for action in the efforts to establish and manage MPAs.

and empowering local communities. Today, local communities are not only involved but also play a leading role in managing Raja Ampat's reefs, achieving a truly sustainable conservation model built on trust, cultural understanding and shared stewardship.

Status as of December 2024

Nearly 20 years after joining Conservation International, Erdmann has risen through the ranks to become Vice President for Asia Pacific Marine Programmes. His holistic strategy, first developed and implemented in 2004, has largely addressed the threats and challenges he identified early on (although new issues continue to present themselves).

Over that time, a total of nine marine protected areas have been established in Raja Ampat, including Indonesia's largest marine national park. These MPAs now span over 1.2 million hectares of the world's most biodiverse reefs and are

for what activities could and could not be conducted within them and restricted access for outside fishers, thereby securing their own food resources for the future.

Most importantly, the staff and rangers for each MPA were recruited directly from the local communities that owned the reef systems within the MPA. In the short to medium term, bringing in external, tertiary-educated Indonesians to manage the MPAs might have seemed the easier path. However, Erdmann and his team recognised that these individuals would likely be seen

as outsiders, disconnected from local realities, and may ultimately wish to return to their own homes and families.

While few local Papuans had received tertiary education, they compensated with a deep commitment to protecting their reefs. Erdmann believed that any gaps in formal training could be addressed through targeted education programmes. Over the course of a decade, local Papuan MPA staff received extensive training in marine biology and resource management. The result is a testament to the power of investing in



THE RESHARK PROGRAMME

Mark Erdmann sits on the ReShark Council. With nearly 100 partners now joining the coalition, he is excited about the prospects of expanding the approach to other geographies and other threatened shark and ray species.

The StAR Thailand project, which will replicate the Raja Ampat leopard shark rewilding programme, was successfully launched in August 2024, and Erdmann envisions projects focusing on the rewilding of additional species (from bowmouth guitarfish to endangered large stingrays) joining the ReShark initiative in the coming years. ■



Erdmann with his team, documenting a leopard shark pup as part of the ReShark programme (above). Leopard sharks (top left) are raised in specially designed nurseries before they are released into the wild (left).

actively managed by local community members with a passionate commitment to conservation.

Where to from here?

By 2014, it had become clear to Erdmann that while Raja Ampat's extensive network of marine protected areas (MPAs) was highly effective at preserving the region's unparalleled biodiversity, certain species, particularly larger sharks and rays, would need additional support to fully recover their populations. In response, Erdmann and his team dedicated significant energy to

championing national-level protections for critical species such as reef and oceanic manta rays, whale sharks and walking sharks.

Their conservation efforts extended beyond policy advocacy, as they collaborated closely with the Raja Ampat Marine Protected Area Authority to introduce targeted tourism management regulations. These measures aimed to minimise human impact on vulnerable species, including safeguarding manta rays at cleaning stations and protecting nursery areas.

Despite these very focused

efforts, some species continued to struggle, requiring further intervention to show tangible signs of recovery. Erdmann's determination to



The “rewilding” programme on Kri and Batbitim islands has successfully raised and released 21 leopard shark pups.



address this challenge led to the creation of “ReShark,” an ambitious initiative sparked in 2015 when he observed the extraordinary success of Singapore’s SEAA Aquarium in breeding endangered leopard sharks—to the point of being overwhelmed by baby sharks!

Disappointed by the absence of any recovery in the leopard shark population, Erdmann envisioned a pioneering “rewilding” programme, where eggs sourced from public aquariums around the world would be brought to Raja Ampat and then hatched in specially designed nurseries in preparation for eventual release into the wild.

Turning that rewilding vision into reality took almost ten years of painstaking planning to ensure that it had both the support and assistance of the Indonesian government, public aquariums and NGO partners. Close collaboration with the IUCN Shark Specialist Group was another key factor, but the

primary enabler was the local logistical support provided by a couple of conservation-minded resorts in Raja Ampat.

Specifically, Erdmann singled out Max Ammer of Papua Diving and Marit and Andrew Miners of Misool Resort, each of whom enthusiastically embraced the rewilding plan and happily allocated space and staff time to construct the first two ReShark nurseries on Kri and Batbitim islands, respectively. The first leopard shark pups, 21 in total, have now been released, and Erdmann’s team has established an ambitious goal of releasing at least 50 pups annually for the next eight years. ■

Don Silcock is an Australian underwater photographer based in Bali, Indonesia. For extensive location guides, articles and images on some of the best diving locations in the Indo-Pacific region and “big animal” experiences globally, visit his website at: indopacificimages.com.

