

SEPTEMBER 2021

REEFS FOR THE FUTURE

**ASSURING THE FUTURE OF RESILIENT
CORAL REEFS AND COMMUNITIES | FINAL
REPORT TO THE TIFFANY & CO. FOUNDATION**

Grant Amount: \$1,000,000

Grant Period: June 1, 2019 - August 31, 2021

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EXECUTIVE SUMMARY

Although coral reefs occupy less than 1% of the ocean, they are home to at least a quarter of all marine life, and they support the livelihoods, nutrition, and well-being of hundreds of millions of people, including some of the world's poorest and most vulnerable communities.

With support from The Tiffany & Co. Foundation, the Wildlife Conservation Society (WCS) has worked closely with local communities and key stakeholders to address major threats to reefs, guided by the following strategies: 1) Expand marine protected area (MPA) coverage and enhance MPA management, 2) Stop destructive and unsustainable fishing activities, and 3) Reduce land-based impacts and development. Our goals are to reduce threats to coral ecosystems, build local leadership, and strengthen science-based management in order to ensure long-term, lasting protection of coral reefs in the face of climate change.

WCS stands for wildlife. Thank you for standing with us.

Over the last two years of this grant, we focused efforts in Mozambique, Kenya, Solomon Islands, Fiji, India, and Belize, as well as scaling up globally to protect coral reefs. Some highlights of our progress include the following:

In Belize, WCS is affirming its commitment to inform management of marine resources and to engage, educate, and celebrate local fishing communities through a multifaceted communications approach. These efforts are part of an ongoing strategy to promote sustainable fishing through dissemination of information, interactive community campaigns, and the publication of our first Impact Report. This is more important than ever after coral reef surveys from two key MPAs affirmed global patterns of ocean temperature rise, increased levels of bleaching in coral reefs, and the arrival of the novel Stony Coral Tissue Loss Disease. This survey data was uploaded into the global coral reef database, MERMAID, expanding the repository on the Belize Barrier Reef System to inform conservation and management.

In Kenya, our work has focused on the critically important southern Kenya Reef System, an almost continuous fringing reef that extends approximately 190 km along the coast, from Malindi to Mwazaro. Within this system, WCS is working in the Diani/Chale National Marine Reserve, where we have supported and enabled the effective management of this National Marine Park. And in the Kuruwitu and Msambweni communities, we are supporting the rights of local communities to establish voluntary fisheries closures (locally called tengefus) and co-management of their traditional fishing grounds with government and key stakeholders.

In Mozambique, together with the Ministry of Sea, Interior Waters and Fisheries (MIMAIP), we have publicly presented the country's first National Strategy and Plan of Action for the Management and Conservation of Coral Reefs, which was developed by WCS and the National Institute for Fisheries Research in collaboration with key stakeholders and local partners. We also supported the establishment of four new Marine Key Biodiversity Areas, officially declared on May 21, 2021, which will be prioritized for the country's MPA expansion efforts, and the roll out of a new social-ecological framework to help evaluate MPA performance. Lastly, WCS Mozambique signed a Memorandum of Understanding with MIMAIP to provide guidance and technical assistance to the government toward improved sustainable management of marine resources, including coral reefs.



Globally, WCS is scaling efforts across these sites to advance data-driven decisions on coral reef health. On Earth Day 2021, we launched MERMAID's official "version 1". This online-offline platform enables local coral reef scientists and decision-makers around the world to utilize a robust visual platform that builds on years of development and feedback with users. This tool helps standardize monitoring and metrics for coral reef health and supports policy and management decisions to best conserve these vital ecosystems. The global dashboard now has more than 2,200 sites, 28,000 transects in 15 countries, and 1,000 registered users. MERMAID helps programs measure the impact of their conservation and achieve adaptive management.

In India, WCS is collaborating with local communities to lead effective monitoring and effective management of marine resources in the Lakshadweep archipelago, home to some of the country's richest marine biodiversity. Despite the recent declaration of three new MPAs in the area, which was a major step forward, WCS surveys found declining coral reef health – further emphasizing the need to ensure effective conservation measures are implemented to reduce pressure from unsustainable development plans, expanding fisheries, and increased frequency of climate-driven storms that threaten the resilience of this ecosystem.

In Solomon Islands, WCS has worked with eight local communities in Western Province to develop management plans covering 150 square kilometers of resilient coral reefs and adjacent coastal habitat, and we are working to get the management plans formally recognized under Solomon Islands law. We have provided enforcement training to local resource management and provincial officers, and have provided guidance to the national government on methods to monitor coral reef threats at a provincial scale.

In Fiji, WCS launched a national campaign and multi-sectoral partnership called Watershed Interventions for Systems Health in Fiji (WISH Fiji) in late 2018. Water and Sanitation Safety Plans were developed for 28 villages across five sub-catchments and include 220 interventions prioritized for watershed management. A total of 36 interventions were completed to date, including infrastructure improvements for primary water sources that have provided direct benefits to 758 people. Underwater surveys were completed and provided valuable information to communities on the health of coral reefs. WCS is now working closely with cChange, a local communications NGO, to support a nation-wide Fish Smart Campaign to help the passage of national policy to update minimum size limits for common food fish species.



MOZAMBIQUE

EXPAND MPA COVERAGE AND ENHANCE MPA MANAGEMENT:

WCS led the process to identify and map new Marine Key Biodiversity Areas (KBAs) in Mozambique, sites that significantly contribute to the global persistence of biodiversity as defined by the International Union for Conservation of Nature (IUCN) in their [new global standard](#). WCS helped to identify 29 KBAs, including four marine areas harboring important coral reef habitat, that were officially declared on May 21, 2021 (World Biodiversity Day and World Endangered Species Day) by the Minister of Land and Environment. This achievement highlights Mozambique as one of the first countries to accomplish this milestone of completing a comprehensive assessment across a complex marine ecosystem. The four marine KBAs will be included in the country's strategic expansion of their national network of MPAs and were taken up by the marine spatial planning (MSP), which is already in its final stage of development.

Through our partnership with National Institute for Fisheries Research (IIP), we have been working on strengthening the legal framework and governance around sustainable use of marine resources through the development of the first National Strategy and Plan of Action for the Management and Conservation of Coral Reefs (known as EN-COR). The final draft of this legal document has been presented to stakeholders in a public consultation, is now in the institutional pipeline for ministerial approval, and is expected to be implemented in the first quarter of 2022. The EN-COR lays [1] [SE2] out the necessary steps to meet coral conservation targets in MPAs and effective management of reefs outside MPAs through the designation of new MPAs (targeting 30% of the extent of coral reefs in the country) and enhancing the management of existing ones. It also aims to build technical and scientific capacity for research and monitoring of coral reefs by developing a national monitoring system for this critical ecosystem.

In support of Marine Megafauna Foundation and Ocean Revolution Mozambique, we have developed a social-ecological system framework (SES), including ecological and socio-economic monitoring plans for the community managed fishing areas – APGCs (equivalent to the locally managed marine areas - LMMAs) that they are establishing in Tofo and the Bay of Inhambane, Inhambane Province, which will contribute to the reduction of destructive and unsustainable fishing activities over coral reefs of this province. In May 2021, both NGOs received theoretical and practical training on the field monitoring techniques used in these monitoring plans, so that they will be capable of autonomously monitoring the performance of their APGCs over time. In addition, standard monitoring plans have been developed so that this framework can be expanded nationally and used by other APGC projects to produce consistent national data that can also feed into the global SES framework developed by WCS scientists for better understanding of success factors of APGCs worldwide.

REDUCE LAND-BASED IMPACTS AND DEVELOPMENT:

WCS has supported the government to develop the National Biodiversity Offsetting Framework. Within this context, we are also leading a national team of experts and other stakeholders to define and approve a set of coral reef ecosystem condition indicators that will guide site selection for offsetting impacts from coastal development projects and any activities that may impact coral reef health. These indicators are being combined into a standard index used primarily for offsetting mega-projects and smaller ones, but can also be applied within the national coral reef monitoring programme being developed under the EN-COR.

KENYA



STOP DESTRUCTIVE AND UNSUSTAINABLE FISHING ACTIVITIES:

The Diani/Chale National Marine Reserve (DCMR) is an officially gazetted marine reserve; however, there has been resistance from local communities who have fished in the reserve for generations due to their lack of involvement during the process of establishing the reserve, resulting in a “paper” park. The DCMR is crucial for maintaining marine biodiversity, fisheries, and tourism in Kwale County and therefore a priority for WCS to support its effective management. WCS facilitated discussions between key stakeholders on a process to reinstate management, including at the WCS-led Annual Fishers’ forum in January 2020, where there was agreement on the urgent need for management of the reserve and that fishers need to be engaged at their landing sites to ensure sufficient awareness and dialogue is undertaken at the grassroots level before deciding on a management planning process. Following this, WCS joined and is providing technical assistance to a working group led by the Coast Development Authority (CDA), which is facilitating stakeholder dialogue on a larger seascape that encompasses DCMR.

During the first CDA meeting in March 2021, we presented an overview of our small-scale fisheries (SSF) work in this seascape, as well as management initiatives such as beach seine removal and fisheries closures. The leaders of local community collectives, Beach Management Units (BMUs), expressed their support, but reinforced the importance of intensive awareness-building at landing sites and villages to ensure communities fully support the planning process before activities can be undertaken. The leaders also noted that although many NGOs are doing work in the area, there is insufficient feedback to communities, except for WCS’s Annual Fishes’ forum where we share information on SSF management. This highlighted the importance of regular feedback mechanisms when working with communities. Consequently, we mapped NGO activities along the Kenya coast and have started a dialogue to synergize activities. We will continue to support CDA and the working group, including providing ecological, fisheries, and social information and participatory fishery pattern mapping for the spatial planning of the seascape.

WCS is also strengthening capacity for the co-management of the Kuruwitu and Mwaembe BMUs, where we have long-term relationships, led trainings in ecological and catch monitoring, and supported the first community fisheries closure on the Kenyan coast. Regulations in Kenya require BMUs to go through a planning process to develop a co-management plan before the BMU and any closures within it are legally secure. The Kuruwitu BMU approached WCS to facilitate the co-management planning process. We provided technical support, facilitated dialogue amongst stakeholders, mapped fishing grounds and closures, and helped draft the co-management area plan. We then convened a meeting with government agencies and led discussions to review the plan before it is legalized.

Like many communities along the Kenyan coast, communities in Msambweni have traditionally depended on fishery resources and other nearshore ecosystems for their nutrition and livelihoods. Similar to other areas along the Kenyan coast, this has led to overfishing and the use of destructive fishing methods and has threatened the loss of livelihoods and food security for Msambweni communities. We facilitated the process of building the capacity of the new BMU leadership to better manage their fishing grounds (including the tengefu), including conducting joint coral surveys with WCS and completing the first participatory mapping of their fishing grounds that will provide a better understanding of fishing conflicts in the area. We also completed a management preferences survey to provide information on management options that are most preferred by communities, which will facilitate the development of a roadmap towards a management planning process.



SOLOMON ISLANDS

EXPAND MPA COVERAGE AND ENHANCE MPA MANAGEMENT:

WCS undertook multiple rounds of consultations with local communities to advance development of LMMAs covering over 150 square kilometers of biodiverse marine and coastal habitat in Western Province. Following the launch of the Vurana ecosystem approach to fisheries management (EAFM) plan in June 2020 covering a portion of the coastal area off of northwest Parara Island, changes to the zones and plan rules were requested by the government and agreed-upon by the community. Also on Parara Island, WCS is working with the Rarumana community to finalize their draft EAFM plan. WCS has also significantly advanced development of an EAFM plan for the Munda LMMA that includes measures to protect vulnerable fish spawning aggregations (FSAs). Each community (Nusa Roviana, Dunde, Kekehe, and Lodumaho) within the shared LMMA boundary has appointed their own Resource Management Committees (RMCs) that ensure public understanding of EAFM rules. The RMCs have carried out environmental awareness programs within their communities to help residents better understand the rationale for the rules. Of note, at a Dunde RMC meeting in October 2020, community members voted to include two well-known FSAs within no-take zones. There will be a total ban on all forms of harvesting within these zones for at least a five-year period. The plans for Vurana (revisions), Munda, and Rarumana will all be submitted to the Ministry of Fisheries and Marine Resources (MFMR) by October 2021. In addition, WCS continues to support our local partner, Solomon Islands Community Conservation Partnership (SICCP), to finalize management plans for Chubikopi and Peava LMMAs, with submissions to MFMR expected to take place in the last quarter of 2021.

STOP DESTRUCTIVE AND UNSUSTAINABLE FISHING ACTIVITIES:

We have worked closely with WorldFish and the LMMA network to develop a professionally designed version of a [policy gap analysis](#), which we have disseminated to key Solomon Islands government staff, particularly those involved in the National Coordinating Committee for the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security. We implemented various activities to improve reef monitoring, control, and surveillance based on outcomes of the analysis. We designed and produced two billboards showcasing the new MFMR Inshore Fisheries Regulations. We have installed these billboards at the food markets in Munda and Noro, and displayed poster versions at public facilities throughout Munda, including at fish retail outlets, the airport, and schools. We have printed brochures of the regulations that we will further distribute within communities and to tourism operators around the Munda area (Roviana and Vonavona lagoons) and in Marovo Lagoon. In partnership with the Solomon Islands Environmental Law Association and the Landowners Advocacy and Legal Support Unit of the Public Solicitor's Office, WCS organized trainings for 12 Western Province police and fisheries officers in July 2020 on environmental laws and options for their enforcement, followed by trainings in March 2021 for approximately 20 community members from Munda to enhance their understanding of the National Fisheries Management Act 2015 and the Western Province Fisheries Ordinance 2011.

REDUCE LAND-BASED IMPACTS AND DEVELOPMENT:

[Our study on land-based impacts](#) from land clearing on Kolombangara Island was published in the Journal of Applied Ecology, with results featured in an [article published on Mongabay](#). Outcomes of the research are being used during consultations with landowners to establish a formal forest protected area on over 400 m of customary land on the island, with complementary funding from the Critical Ecosystem Partnership Fund and Rainforest Trust. WCS is also in the last stages of finalizing a new project that will provide funding for additional nature-based solutions (e.g., riparian restoration, soil conservation measures) to reduce sediment runoff onto nearshore coral reefs around Kolombangara. We adapted a [global scale coral reef threat analysis](#) (Andrello et al. 2021) to the [local Solomon Islands context](#), focused largely on land-based threats, and we distributed this guidance for monitoring these threats to the Solomon Islands government.

INDIA



EXPAND MPA COVERAGE AND ENHANCE MPA MANAGEMENT

In 2020, the [Lakshadweep Administration declared three new MPAs](#) (645 km²) in the archipelago to protect this fragile and rich marine ecosystem supported by coral atolls. This declaration has enabled additional support for another protected area, Angria Bank (2,2000 km²), a submerged plateau off the north-western coast of India, where [WCS conducted an important expedition](#) to survey this area's exceptional coral reefs. During this grant, WCS worked closely with government and community stakeholders to conduct key research on coral reef health and promote greater awareness on sustainable practices in these [unique and biodiverse areas](#). While visitors were prohibited from entering the Lakshadweep islands during the COVID-19 pandemic, WCS finalized research plans and completed a literature review on the islands' marine biodiversity, human dependence on them, and existing threats. We also worked with local divers to prepare a [brochure on best dive practices](#) with illustrations of the Lakshadweep islands, which will be used to generate awareness on safety and conservation among tourists.

After COVID-19 restrictions were lifted and mainland visitors were allowed into the islands in April 2021, WCS conducted dive surveys to assess coral reef health at two popular dive sites in the islands, covering an area of 2,100 square miles. Our surveys revealed low coral cover in the two sites (13.9% and 25%) – below the sustainable threshold to maintain healthy reef growth. WCS also collected data on algae and other key benthic groups and found a potential shift from coral to algal dominated habitat; moreover, a few corals were observed to be either physically broken or displaying disease, which suggests compromised health. In our surveys, we recorded over 900 fish individuals belonging to 10 families and 28 genera and more than 600 reef-associated invertebrates. We also recorded a higher abundance of herbivores and planktivores compared to carnivorous fish, which studies have shown can negatively impact reef health. However, additional studies at popular dive sites are needed to better understand fish abundance and diversity, as well as the impact of dive tourism, which we were unable to complete at this time due to the pandemic. Our preliminary data indicates weakened reef health, which could be further impacted by the impending threats such as increased storm surges, rising sea temperatures, and marine pollution.

We also completed marine debris surveys and interviewed local dive professionals to understand their perceptions of tourism and coral reef conservation in the area. Our lagoon surveys showed low densities of marine debris, indicating good waste disposal management in the islands, despite commonly found items such as plastics. Gunny bags, used for transporting construction material to the islands, were also common, and dive professionals raised concerns about the impact of these on coral and fish. Our interviews with local dive professionals also revealed concern about an increase in dead coral; however, they felt that dive tourism did not negatively impact the reefs, and in fact, resulted in increased monitoring of these sites and helped remove fishing nets and other plastic.

Finally, we interviewed community members to gauge local perception of the newly declared MPAs and understand management needs. We learned that while protection task forces have been formed to monitor the beaches and the sea cucumber reserve, some stakeholders pointed to gaps in monitoring such as insufficient effort and methods. A [previous study](#) also revealed that while local people felt that MPAs would benefit the islands, they had doubts about the management and efficacy of these areas. Nevertheless, the local administration's effort in the declaration of three new MPAs has been a considerable step towards conserving the invaluable marine ecosystem of the Lakshadweep islands.

REDUCE LAND-BASED IMPACTS AND DEVELOPMENT

WCS Fiji launched a national campaign and multi-sectoral partnership called Watershed Interventions for Systems Health (WISH Fiji), focused on targeted and integrated upstream catchment management and policy implementation to reduce the spread of disease and improve downstream ecosystem conditions across five subcatchments. Since its inception, we have completed extensive baseline surveys to identify areas and activities that pose a high disease risk for local communities and downstream corals.

These data were used by 28 communities to inform development of 28 Water and Sanitation Safety Plans (WSSPs), in which 220 interventions have been prioritized to reduce disease risks. Interventions have been grouped into main categories: agriculture, drainage control, fisheries, forestry, health, livestock, river bank stabilization, sanitation, waste and water. Extensive consultations were undertaken with government agencies and other stakeholders to identify how we will co-implement the management interventions in each of the five sub-catchments. In support of this, WCS signed two new memoranda of understanding with the Ministry of Agriculture and iTaukei Land Trust Board, which will strengthen our partnerships with these important agencies to address unsustainable land use practices and protect watershed biodiversity and resources. A total of 36 interventions were completed prior to COVID-19 government restrictions in April 2021. These interventions include infrastructure improvements for primary water sources, which have provided direct benefits to 758 people in 168 households across five villages. Despite ongoing COVID-19 restrictions, WCS is working very closely with Fiji Government agencies and the Water Authority of Fiji, who are able to access some of the project sites, to provide supplies to communities to enable further implementation of interventions.

Underwater visual census surveys of fish, benthic communities, and coral disease were completed for reefs downstream of the Bureta, Dawasamu, and Waibula sub-catchments between September and October 2019 using WCS Fiji's standard monitoring practices. Data for the three completed sub-catchments have been entered and stored in WCS's online [MERMAID platform](#), and showed coral cover on inshore reefs ranging from 16.9-23.1% and high silt (sediments from terrestrial sources) cover. Catch per unit effort surveys of marine and freshwater fish landings with local fishers in each sub-catchment showed a high percentage of fish that are caught below the size of maturity. WCS is now working closely with cChange, a local communications NGO, to support a nation-wide [Fish Smart Campaign](#) to highlight the importance of complying with legal size limits, which, if successful, will help the passage of national policy to update minimum size limits for common food fish species. The Ministry of Fisheries and WCS have completed assessments to determine the size at which different fish mature to update Fiji's outdated size limits from the 1940s. WCS has also produced a number of [community factsheets and training materials](#) to promote a greater understanding of sustainable fishing and coral conservation practices.

The effects of the global COVID-19 pandemic on Pacific Island countries have been extremely varied; some countries have had to manage viral infections while others are so far managing to keep the virus entirely from their shores. As a response, WCS partnered with the LMMA network in 2020 to undertake [a rapid assessment](#) to gain insights into changes occurring in villages and their fisheries across seven countries in the Pacific, including Fiji. We found that local food production practices of farming and fishing, as well as food sharing, which have sustained rural Pacific communities through disasters for centuries, conferred resilience during COVID-19. Most Indigenous communities in Fiji were able to ensure food availability. Fishing pressure did not generally increase, though this was more likely where in-migration to villages was higher. This contrasted with [a second WCS-led study](#) of non-Indigenous fishers, who faced higher food security and greater impacts to fisheries livelihoods. Many of these fishers were vulnerable because they do not have access to social security or similar safety nets, nor access to insurance systems for job loss or damages to fisheries infrastructure resulting from cyclones.

BELIZE



EXPAND MPA COVERAGE AND ENHANCE MPA MANAGEMENT:

WCS conducted coral reef surveys at two key protected areas in order to evaluate the impacts of climate change and management interventions on vital coral reef ecosystems: Glover’s Reef Marine Reserve and South Water Caye Marine Reserve. During bleaching surveys and collection of temperature data at Glover’s Reef in November 2020, temperature loggers indicated that the mean monthly temperature of the water was warmer in 2020 than in 2019 by 32.9 degrees Fahrenheit. The water temperature also exceeded 86 degrees Fahrenheit in June 2020, much earlier than previous years. Coral bleaching was observed in 30 species – with only 8% of coral colonies found to be fully bleached, though 29% exhibited partial bleaching.

WCS also conducts [biennial reef monitoring activities](#) to assess fish biomass and coral cover – two important indicators of coral reef health – in these reserves. This survey effort, which included 12 core reef sites along the Belize Barrier Reef in July and August, was entered into the [MERMAID](#) online platform, including data from South Water Caye Marine Reserve for the first time. A full summary of the survey results can be viewed at the [MERMAID dashboard](#), a facility which also supports data sharing with interested parties. Benthic data summaries revealed the average coral cover to be 25.7%, while mean macroalgae cover was 36.5%. Using the rubric provided by the Healthy Reefs Initiative, despite macroalgae cover being critically high (>25%), mean coral cover can still be considered in “Good” condition (>20%).

Fish transect data entry hasn’t been finalized, but preliminary results from three of the sites indicate a reef fish biomass of approximately 300 kg/ha – WCS studies have indicated that ecological degradation accelerates when fish biomass falls below 300 kg/ha. This is supported by another study of Caribbean coral reefs, which suggests that ecosystem function and species begin to dramatically degrade at 600-800 kg/ha. Unfortunately, widespread coral bleaching was already visible during the August surveys and stony coral tissue loss disease was observed on at least two sites.

STOP DESTRUCTIVE AND UNSUSTAINABLE FISHING ACTIVITIES:

As WCS continues to build relationships with our stakeholders, we conducted outreach and community mobilization in fishing villages, which allowed us to engage coastal communities in sustainable practices and reef conservation. We met with fishers from three villages – [Dangriga](#), [Sarteneja](#), and Hopkins – to promote sustainable coastal fishing, for which there was widespread support, including diversifying into deep-sea fishing. We also spoke with several members of each community, who emphasized how important it was to protect the jobs of fishers to sustain Belize’s marine species for “future generations.”

Part of sustainable management is making information available and accessible to fishers and the public. We continue to share up-to-date information and reminders about the [2021 closed season for conch](#) and support the Fisheries Department with the [opening of the lobster season](#). Additionally, despite the COVID-19 pandemic, WCS participated in virtual activities to celebrate [Reef Week 2021](#), with daily reef Trivia, [managed access](#), and more. WCS Belize is also excited to launch our first [Impact Report 2020](#), which outlines the important work we have done to protect our marine resources.

June was filled with exciting and educational activities, as it is annually, to celebrate fishers. Fisherfolk month, as many have come to know it, begins with the annual call to the fishing community and the public for submission of [nominations](#) for the Fisher of the Year to identify those who have made significant positive impact on the industry. This year, the planning committee offered special recognition to fishers who have shown resilience amidst the COVID-19 pandemic. We selected fisher of the year, Maria Allen, and two [Outstanding Fishers of the Year 2021](#). Overall, this event provided the opportunity to support fishers who continue to set a positive example, and encourage others to do the same.

— GLOBALLY



A DATA-DRIVEN APPROACH TO MEASURE CORAL REEF HEALTH AND INFORM CONSERVATION

With the support of The Tiffany & Co. Foundation, we reached a development milestone (version 1) for the innovative coral reef platform, MERMAID (datamermaid.org). This release represents a stable and robust platform built on years of development and feedback with field users, including the sites and countries presented in this report. Notably, our version 1 milestone includes new features requested by users, such as:

- The integration of habitat classifications from the [Allen Coral Atlas](#) with MERMAID, which allows users to navigate sites with Allen Coral Atlas habitat layers and export habitat classifications.
- Substantial updates to the R package ‘[mermaidr](#)’, which allows users to import and download projects directly into R for fast and reproducible analysis. This [package](#) also allows users to access automatically calculated transect- and site-level averages to code data directly into beautiful plots and reports.
- Improved speed, such as faster access to data via the ‘Export CSV’ button, the [Global Dashboard](#), and [mermaidr](#) due to substantial improvements to the aggregated API endpoints.
- New API [documentation](#) for development and collaborations.

In addition to development, we have also evolved our communications strategy for MERMAID, including: new quarterly newsletters to 1,000+ subscribers featuring a ‘stories from the field’ section highlighting the positive on-the-ground impacts of MERMAID in coral countries around the world; development of MERMAID’s brand including [new brand guidelines](#), and the planned launch of a revamped website ([which you can see in staging here](#)) in alignment with MERMAID’s fresh look and feel, slated to go live the first week of October 2021.

Over the last year, MERMAID has been highlighted by the International Coral Reef Initiative (ICRI) as a key technology tool in support of the proposed post-2020 biodiversity framework indicators on coral reefs. WCS presented MERMAID to the 35th annual ICRI meeting and to a Commonwealth Blue Charter event on technological monitoring innovations for coral reef conservation. These efforts were highlighted in an article ‘[We can save Earth’s coral reefs](#)’ for Scientific American that highlighted the role of MERMAID in helping national governments track progress on key indicators of coral reef health, integrity and function to measure against science-based thresholds.

Learn more
datamermaid.org



LESSONS LEARNED

IN MOZAMBIQUE, we experienced challenges related to establishing an efficient workflow with government institutions due to complex national processes between stakeholders, chains of communication, and approval processes. In particular, every decision needs to be approved internally by the highest lead of each government institution and feedback between WCS and the governmental hierarchy has therefore been slow, exacerbated by the COVID-19 pandemic. Nonetheless, we have adapted to the situation, maintaining contact with government partners, and have learnt that constant dialogue and follow-up meetings are key to maintaining engagement. Planning that takes into account the unavoidable delays is also important to ensure milestones are met by the deadline, although some flexibility is essential. Establishing MoU and agreements with key government institutions has also been instrumental in securing WCS's position as a major technical advisor to conservation initiatives at the state level. Finally, providing training, resources, and tools for virtual communication (such as supplying internet modems) was really helpful to continue collaborative work during the pandemic.

IN KENYA, we learned the importance of communicating scientific feedback and other knowledge to communities on a regular basis. For example, the Fishers' Forum is conducted on an almost annual basis, run in Kiswahili, the common language in Kenya, and features relevant subject matter based on data collected at the landings sites and the reefs where the participants fish. We also learned the importance of extensive and sustained dialogue with and between communities and key stakeholders, especially when establishing co-managed areas and MPAs. Lack of sufficient dialogue can lead to long-term suspicion, as has occurred in the DCMR, or failure to effectively manage co-managed areas that require cohesion and coordination of a diverse group of stakeholders, as in the case of the Mwaembe BMU. Lastly, our work continues to emphasize community engagement as the foundation of SSF and coral reef conservation.

IN SOLOMON ISLANDS, there are already many good regulatory measures that provide conservation benefits to coral reef species and ecosystems, but knowledge of these rules and measures to enforce them are poor, even among provincial government staff. We thus focused considerable effort in providing training and technical support to provincial government, police, and community managers that will ideally translate into more effort on monitoring, control, and surveillance, as well as increased compliance with the management rules.

IN FIJI, the country has experienced three highly destructive tropical cyclones (Harold, Yasa, Ana) since early 2020, while trying to manage the spread of COVID-19 within its borders. While these stresses have created new challenges for government, communities, and conservation practitioners, they have improved our understanding of the vulnerability of different socioeconomic groups (e.g., men vs. women, different ethnic groups) to multiple and overlapping stresses. Our work has shown the need for a [greater focus on social equity](#), and looking at disasters and other disturbances through an intersection lens.

IN INDIA, there is an urgency to address land-based impacts and sustainable development to secure the marine ecosystems of the Lakshadweep archipelago. Our initial findings from coral reef surveys suggest that coral reef health is declining, and that management plans for sustainable tourism and development are needed to safeguard this important coral reef habitat. Moreover, the [planned increase in tourism](#) has caused some alarm over [potential threats to the area's rich and fragile ecosystem](#), and our completed assessment of dive tourism and marine debris provides important information and a baseline to measure the efforts of programs for sustainable practices and waste management. We plan on conducting further studies at popular dive sites after the monsoon season and stakeholder interviews in order to work with the government to develop and implement effective management and conservation measures.

IN BELIZE, while coral cover in the South Water Caye Marine Reserve remains relatively high, preliminary analyses of fish biomass indicate that this ecosystem may be at the threshold of ecological degradation. This is symptomatic of the myriad of threats faced by coral reefs in Belize, including climate change, land-based pollution, and chronic management resource deficits. WCS Belize continues to build off our work from the last decade, collaborating with local partners to effectively assess and publish key recommendations to inform management and protect livelihoods. We have found that introducing new technologies (such as MERMAID and SMART) for enforcement and monitoring, brokering local and international collaborations, and keeping our finger on the pulse of stakeholder concerns and viewpoints is an effective means to optimize and overhaul management strategies.

AND GLOBALLY, we learned that there is significant need and potential for a data-driven approach to measure coral reef health, that is simple and streamlined, in order to monitor and evaluate the success of coral reef conservation interventions. At over 1,000+ users, we are anticipating the launch of our revamped communications strategy, website, and technical features, to generate greater awareness and more users, which will lead to more effective outcomes for coral reef management and conservation.



RECOGNITION



We were pleased to recognize The Tiffany & Co. Foundation for their generous support in our 2020 and 2021 Impact Reports. The Foundation is also listed on the WCS Corporate Supporters [website](#), the WCS Corporate Philanthropy [website](#), and recognized as a corporate partner on Bronx Zoo grounds. In addition, we have acknowledged the support of The Tiffany & Co. Foundation via the following:

- Verbal recognition in connection with local partner meetings
- Report to the Department of Environment & Forests, Lakshadweep islands and on the [Best Practices for Diving in the Lakshadweep Islands](#) brochure
- [WCS Belize Impact Report 2020](#)
- [A Summary of WCS Knowledge on the State of Coral Reefs in Mozambique](#)
- [A Facilitator's Guide for Ecosystem-Based Management Planning in Fiji](#)
- *Forthcoming recognition in quarterly MERMAID e-newsletters
- WCS Press Releases:
 - [Breakthrough Study Shows No-take Marine Reserves Benefit Overfished Reefs](#)
 - [Rare climate refuge for coral reefs discovered off the coast of Kenya and Tanzania](#)
 - [Study Finds Only 2.5 Percent of the World's Coral Reefs Are Currently Being Actively Protected](#)
 - [WCS Congratulates Government of Belize On Newly Expanded Sapodilla Cayes Marine Reserve](#)
 - [Logging Tropical Forests Jeopardizes Fisheries Important for Food and Livelihood](#)
 - [Scientists Discover Rare Bright Spot for Corals](#)

THE NEED FOR HEALTHY OCEANS REMAINS AS IMPORTANT AS EVER, ESPECIALLY DURING TIMES OF GLOBAL CRISIS AND CHANGE.

Despite the unprecedented challenges the world currently faces, WCS has continued to strategically advance critical coral reef conservation initiatives in key geographies in order to help sustain the livelihoods of millions of people, who depend on these invaluable ecosystems. We remain grateful for the long-term support and partnership of The Tiffany & Co. Foundation, which has enabled us to make meaningful progress towards protecting coral reefs in the face of climate change and other growing threats.



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