

FY23 ANNUAL REPORT

Global Aquaculture

A REGENERATIVE FUTURE STARTS HERE



OUR MISSION

To ensure that aquaculture is low carbon, supports biodiversity, contributes to ecosystem restoration, creates employment for local communities and women, and provides healthy, safe seafood for a growing population.



OUR VISION

A world where aquaculture is the leading regenerative food system.



Where We Work

Director's Note

Aquaculture's capacity to achieve environmental goals is twofold; not only can it provide a resource-efficient means of animal protein, but it can also accelerate ecosystem restoration.

I am heartened by the growing recognition of aquaculture's global potential as an environmental solution. Seaweed has gained significant traction as the "super crop" of the future, with vast areas suitable for cultivation, comparatively low resource requirements, and potential for habitat and carbon gains. The World Bank recently made seaweed one of its focus areas, inspiring several NGOs and foundations to support the growth of a sustainable industry with The Nature Conservancy as a core partner. In those partnerships, TNC is developing tools, practices, markets, and relationships to scale seaweed aquaculture across priority geographies in East Africa, Indonesia, Australia and New Zealand, Chile, and North America.

Bivalves, which similarly require few inputs and provide environmental benefits, are another logical area to prioritize. Early in the COVID-19 pandemic, TNC and Pew Charitable Trusts' Supporting Oyster Aquaculture Program (SOAR) was a major success for the industry and the environment alike, replanting millions of oysters while providing economic support for farms. We are pleased that Builders Initiative and the National Fish and Wildlife Foundation have provided support to expand the SOAR program under a renewed vision: to demonstrate how the aquaculture industry can be a core partner in restoring coastal habitats. After seeing the extraordinary benefits of this program, it is clear that this model of collaboration between the aquaculture

sector and ecosystem restoration has nearly limitless potential to be reproduced with other species and in other geographies.

Though TNC's efforts have historically centered on bivalves and seaweed, we are expanding our horizons to apply the same thinking to other, more environmentally challenging sectors, striving for nature-positive production. I recently had the opportunity to visit Southern Vietnam, where local farms Minh Phu and Blue You have partnered to cultivate more than 10,000 hectares with an integrated mangrove and shrimp farming model that maintains mangrove forests on 60% of the pond. This success can be replicated elsewhere; TNC is implementing similar practices in Indonesia and developing a model for low-carbon shrimp farming in Ecuador and Thailand.

Because of the sector's advantages, many nations are seeking to expand aquaculture domestically. As they do so, it is critical that federal, regional, and local governments are armed with the appropriate decision support tools and management approaches to ensure positive outcomes for people and ecosystems. Without that support, an expanding aquaculture industry could put more than 10 million hectares of critical biodiversity areas at risk of degradation. That is why TNC is endeavoring to address potential challenges before they arise, working together with governments, industry, and coastal communities on aquaculture industry spatial planning and area management. We've successfully completed a four-year project with the Government of Palau, identifying go and no-go zones within the country. We are now scaling the project to the African Great Lakes and



coastal Mexico and aim to replicate the approach in at least ten jurisdictions over the next five years.

As the aquaculture industry has grown, so has TNC's global aquaculture team and the scope of our work. Since its inception in 2016, the program has grown to 11 full time employees who are ready to meet the challenge. With the support of regional staff across the world and partners in industry, science, and government, our goal is to advance aquaculture that benefits water quality, improves habitat, and reduces carbon emissions, while providing food and high-quality jobs in coastal communities.

We are honored by your partnership and continued collaboration to help us ensure that aquaculture can meet its potential in addressing biodiversity loss and climate change. In the year ahead, we are eager to build on our success to help promote a marine food system where people and nature thrive together.

ROBERT JONES, *Global Aquaculture Lead*

OUR IMPACT
Program start to date

7.9 million
hectares of water
under improved
aquaculture
management

1,635 farmers
with increased
economic
opportunity

More than
\$75 million
mobilized towards
sustainable
aquaculture projects

10 globally
influential science
products

On-the-ground
work with farmers
in **15 countries**



Our Priority Initiatives



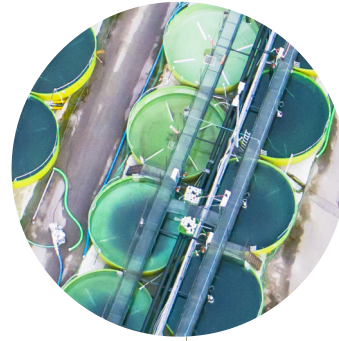
SUPPORTING OYSTER AQUACULTURE AND RESTORATION (SOAR)

Support farmer resilience and partner with industry to recover lost shellfish reefs.



SCIENCE AND TOOLS FOR MANAGEMENT

Improve understanding of the benefits and impacts of aquaculture and create tools to improve management of the sector.



BLUE REVOLUTION FUND

Demonstrate at scale that regenerative aquaculture can generate attractive returns and set the gold standard for aquaculture impact investing.



RESTORATIVE SEAWEED

Generate new, climate-resilient economic opportunities for women and Indigenous communities.



LOW CARBON FUTURE FOR AQUACULTURE

Address climate impacts of commodity aquaculture and mobilize farmers to support climate action.



Healthy Ecosystems, Thriving Shellfish Farms

Supporting Oyster Aquaculture and Restoration

Through the Supporting Oyster Aquaculture and Restoration (SOAR) program, TNC is working to build a resilient oyster industry and partner with the aquaculture sector to accelerate reef restoration—a win-win for these environmentally friendly businesses and our coastal ecosystems.

Created in collaboration with Pew Charitable Trusts, the U.S. National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of Agriculture (USDA), SOAR was originally designed during the COVID-19 pandemic to simultaneously support farmers and the environment. Through the program, we have realized that oyster farmers can be strong, long-term partners in rebuilding coastal ecosystems.

SOAR is taking a three-pronged approach to help both farmed and wild oysters thrive:

1. The **Purchase Program** purchases farmed oysters and uses them in nearby oyster restoration projects, providing an additional income stream for growers and aiding in reef recovery.
2. The **Shellfish Growers Resiliency Fund** provides grants to shellfish farms and aligned organizations for projects that promote resilience, sustainability, innovation, and equity in the industry.
3. A **Diversity, Equity, Inclusion, and Justice** initiative supports underserved communities engaged in shellfish aquaculture and ensures that restoration efforts benefit those communities.

In its first phase, which wrapped up in fiscal year 2023 (FY23), the Purchase Program restored nearly 40 acres of reef and sustained over 450 jobs across seven U.S. states. Additionally, the Resiliency Fund distributed over \$1 million to support 36 projects in 16 coastal states, including educational initiatives to promote Indigenous-led hatcheries in Alaska, experimental development of new substrate structures that stimulate oyster growth on farms and reefs, piloting new gear and new species for restorative aquaculture, and recycling programs that turn restaurants' oyster shell waste into ecological barriers against flooding.

This fiscal year, the SOAR team secured more than \$6.5 million in additional funding to launch the second phase of SOAR. With grants from the National Fish and Wildlife Foundation's National Coastal Resilience Fund and the Builders Initiative, among other contributions, the Purchase Program will grow from seven to eight states, while the Resiliency Fund expects to sponsor an additional 50 farmer-led initiatives that encourage diversity, equity, and inclusion in the shellfish industry; diversify products and marketing streams; encourage grower participation in marine conservation efforts; and enhance sustainability of farming operations.

PROJECT LEAD

Boze Hancock

Senior Marine Habitat Restoration Scientist

bhancock@tnc.org

OUR IMPACT

125 shellfish farms supported

450+ jobs sustained across seven states

3.5 million oysters purchased

40 acres of native shellfish reefs restored

28 small projects funded



Growing Oysters in China for People and Nature

Supporting Oyster Aquaculture and Restoration

Constituting a quarter of China's mariculture production, oyster aquaculture holds crucial importance for economic development in the country's coastal regions. But farmers are facing increased constraints on environmental resources, including limited farming space, exceeded environmental carrying capacities, and climate change, all of which have impeded the industry's potential for further growth.

Amidst growing interest in restorative aquaculture, TNC and our partners are exploring the applicability of this concept within China's oyster farming industry. By promoting knowledge exchange between Chinese and international stakeholders and by supporting

development of restorative oyster practices tailored to the local context, we aim to improve China's oyster sector for the benefit of both people and nature.

TNC, in collaboration with China Society of Fisheries and China Aquatic Products Processing and Marketing Alliance, initiated a series of webinars under the theme "Green and High-Quality Development of the Oyster Industry." Academics, experts, and farming practitioners from China, the United States, and Australia were invited to share their insights on the interactions between climate change and oyster farming in the first webinar, which attracted more than 90 attendees.

With the support of the Global Environment Facility (GEF) Small Grants Programme, TNC and several academic and industry partners also launched a research

project on the oyster aquaculture management in Zhenhai Bay in Guangdong. Currently, we are assessing the impacts of farming practices on water, sediment, and biodiversity in the bay. Additionally, the project will develop best management practices based on environmental carrying capacity of the bay and trade-offs considered by local multi-stakeholders; TNC will work with farmers to promote those practices within the bay, fostering the shift towards restorative aquaculture.

PROJECT LEAD

Qing Liu
Marine Project Officer

qing.liu@tnc.org



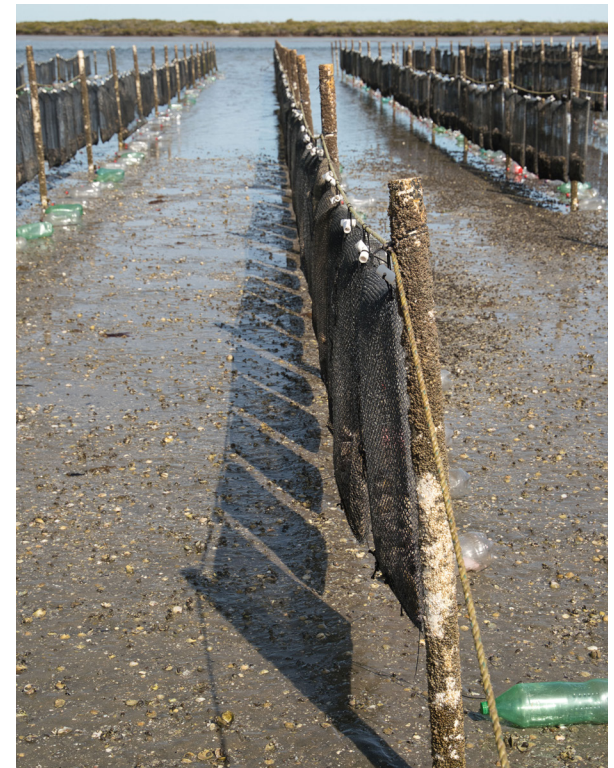
Bivalves for a Thriving Baja Peninsula

Supporting Oyster Aquaculture and Restoration

The seas surrounding Mexico's Baja California Peninsula are among the most biodiverse on Earth. Despite the region's importance, numerous species, including clams and scallops, have been overharvested and critical habitats like oyster reefs are now considered to be functionally extinct. This poses serious risks to ecosystem function and the delivery of critical ecosystem services, such as water filtration, carbon capture, and habitat opportunities for invertebrates.

Fortunately, the Baja Peninsula represents a marine ecosystem with outstanding potential for sustainable aquaculture expansion. If done properly—with the right practices and in the right places—shellfish farms can help alleviate fishing pressure while stimulating local economies and replenishing depleted bivalve populations. In collaboration with the Fisheries and Aquaculture National Instituto in Mexico (INAPESCA), TNC is setting the foundation for the growth of sustainable bivalve aquaculture in the Baja Peninsula. Together, we are developing an online decision support mapping tool that will provide farmers and government agencies with information to responsibly site bivalve farms and reduce the impact of future finfish farms, based on best available science. Additionally, we are completing an analysis of the regulatory framework relevant to aquaculture in Mexico to identify opportunities for a sustainable future.

In February and April of 2023, TNC convened workshops in La Paz and Ensenada with state and federal government officials, farmers, academic institutions, and non-profits to discuss the siting analysis in the region and identify gaps in the regulatory framework.

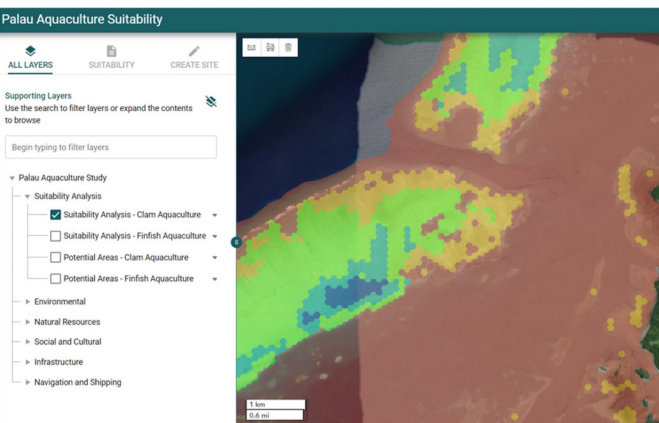


For each of these products, feedback was solicited, documented, and incorporated. By the end of this year, we will complete the smart siting tool with input from key stakeholders, a document to provide sustainability guidelines for aquaculture development, and the capacity building training around smart siting and the regulatory framework.

PROJECT LEAD

Mariana Walther Mendoza
Gulf of California Fisheries Lead

mariana.walther@tnc.org



Smart Siting for Sustainable Growth

Science and Tools for Management

Determining where to establish aquaculture activities has long been a challenge in the sustainable development of the industry—which is where siting analyses comes into play. Siting analysis is a process that aims to identify appropriate locations for aquaculture activities and farms, and it is gaining momentum around the world as an approach to better assess—and balance—environmental and community needs.

2023 was a big year for TNC's Smart Siting program, with the successful conclusion of our siting work in Palau, where state and national governments are now using our [tools](#), analyses, and siting guidance in their planning process. We also started three new projects around the globe, which demonstrates the growing commitment by global governments to integrate smart siting into aquaculture planning efforts.

With TNC's Mexico Oceans Program, the Global Aquaculture Team launched their Baja Peninsula Smart Siting Project. This project, which ultimately intends to develop a decision support tool, recommendations for the legal framework around aquaculture management, and a training curriculum for aquaculture planning, has already reached several key milestones; in February and April 2023, the team held stakeholder meetings to present draft results and collect feedback. Input from those sessions will inform the final products to be delivered in FY24.

Representing nearly two-thirds of total production, freshwater aquaculture is an emerging focus area for the Global Aquaculture Team. So far, much of this work has centered on the African Great Lakes (AGL), where TNC has initiated two projects. The first is a smart siting project on Lake Tanganyika, launched in collaboration with TNC's Africa Program and with support from local and regional governments. As aquaculture expands on the lake, the project will be key in determining ideal locations for new operations that avoid sensitive habitats and protected areas, while accounting for economic and social considerations.

This work is complemented by the TRUEFISH Project on Lake Victoria, a partnership between the Lake Victoria Fisheries Organization, Landell Mills, Food and Agriculture Organization (FAO) of the United Nations (UN), and WorldFish, with funding from the European Union. The multi-year project will promote harmonized aquaculture development between the three countries on Lake Victoria (Kenya, Tanzania, and Uganda) and provide zoning to ensure the protection of biodiversity and sustainable development. TNC will continue to play an important role in this larger project into FY24 by providing high resolution siting analysis.

PROJECT LEAD

Jonathan MacKay

Aquaculture Spatial Scientist

jonathan.mackay@tnc.org

FROM TOP A market-sized oysters in Baja Mexico; By using NOAA and NASA satellite data, this new tool helps Palauans determine the best spots for aquaculture farms; A farmer feeds tilapia on Lake Victoria in Kenya. © TNC (all)

Seaweed Farms as Habitat

Building Knowledge Across International Borders



CLOCKWISE FROM TOP: A seaweed farm in New Zealand. © Premium Seas New Zealand; A researcher examines seaweed in Maine. © University of New England; A fish hangs out in Mariko Wallen and Louis Godfrey's seaweed farm in Placencia, Belize. This farm grows two species: *Eucheuma* (for consumption) and *Gracilaria* (used for skin treatments and cosmetics). The farm is part of a program sponsored by TNC to bring seaweed aquaculture to the area in cooperation with the Placencia Fishermen Cooperative. © Randy Olson/TNC

Science and Tools for Management

Though wild seaweed provides essential habitat in marine environments, until recently there has been scant research on the possibility of farmed seaweed playing the same role, particularly in temperate climates. As of 2020, only seven published studies examined the role of seaweed farms as habitat, all of which focused on tropical species and ecosystems. To bridge this gap in understanding, TNC has partnered with the University of Auckland and University of New England to assess the potential role of seaweed farms in providing habitat in temperate environments.

Parallel sampling methods have been adopted in the Hauraki Gulf in Aotearoa, New Zealand, and the Gulf of Maine in the U.S. to assess the effect of farm type and local environmental conditions on the abundance and variety of invertebrate and fish species.

In New Zealand, mussel farms and mussel and kelp co-culture appear to be providing habitat equivalent to adjacent natural reef and soft sediment habitats, supporting fish settlement and recruitment. These two aquaculture habitats were also found to be of sufficient quality to support the growth of a cryptobenthic fish species faster than natural habitats. In Maine, there has been strong seasonal differences on the kelp farms. The farm areas exhibited no difference in species diversity and abundance of bottom-dwelling species when compared to the reference sites during winter months, and showed a significant increase in the summer months, a valuable observation about species' use of seaweed farms in the region and the influence of seasonality. As the aquaculture industry expands, this research could guide management approaches to maximize the ecological benefits of seaweed farms around the world.

PROJECT LEAD

Heidi Alleway

Senior Aquaculture Scientist

heidi.alleway@tnc.org

Investing in the Future of Aquaculture

Blue Revolution Fund

In 2019, TNC released guidance for the aquaculture industry, "[Towards a Blue Revolution: Catalyzing Private Investment into Sustainable Aquaculture Production Systems](#)," together with Encourage Capital. Since then, TNC has been focused on taking tangible steps toward the recommendations outlined in the report by working directly with parties interested in the aquaculture space.

In 2022, TNC partnered with Hatch Blue to develop a sustainable aquaculture project. The project will focus on impacting and influencing biodiversity, climate, areal improvements, and livelihood benefits. Hatch Blue will also work with early-stage technology companies developing products, such as monitoring systems, feed ingredients, and farming systems, that employ restorative approaches and next generation technologies. Ultimately, TNC and Hatch Blue are striving to create a gold standard for practices in the aquaculture space that can be adopted by the broader market.

PROJECT LEAD

Lisa Tucker

*Aquaculture Investment
Conservation Manager*

lisa.tucker@tnc.org

CLOCKWISE FROM TOP Salmon fish farm in Norway. © MariusLtu; Mussels in Bay of Mali Ston © Dreamer Company; © Damocean; Brian Gennaco of the Virgin Oyster Company stands on a skiff in Great Bay in Durham, New Hampshire. © Jerry and Marcy Monkman/EcoPhotography.





Seaweed as a Nature-Based Climate Solution

Restorative Seaweed

Interest in seaweed as a potential nature-based solution to climate change has skyrocketed in recent years. In partnership with Bain & Company, TNC recently examined the potential to support significant near-term growth in restorative seaweed farming through two analyses:

1. Assessing the creation of carbon crediting program to provide supplemental income to existing seaweed farmers that adopt practices to increase carbon sequestration on seaweed farms and/or new seaweed farmers who are interested in obtaining carbon financing.
2. Stimulating demand for sustainably grown seaweed by supporting the growth of new end markets that capitalize on the potential for seaweed product alternatives to replace higher-emissions products.

We found that carbon sequestration from seaweed farms, while important, is relatively small in relation to other blue carbon habitats. Given carbon crediting requirements for additionality and discounts, current blue carbon prices at about \$30 per ton would not provide significant supplementary income for existing farmers or create economic incentives to establish new seaweed farms. For supplemental income from a carbon crediting program to be material, voluntary carbon prices would need to approach between \$300 to \$500 per ton or additional scientific data or new farming practices would need to be identified that significantly increase carbon sequestration of farms and/or reduce uncertainties.

In assessing the market growth of novel use cases for seaweed as a direct alternative to more emissions-intensive products, biostimulants and bioplastics are two of the most promising markets to grow seaweed farming over the next five to ten years. If price gaps can be closed through product premiums and/or processing efficiencies, each market could support the growth of approximately 1 million tons of farmed seaweed. All stakeholders in the seaweed ecosystem have a role to play in establishing new markets for seaweed, helping seaweed products compete with higher emissions alternatives, and ensuring that the industry develops sustainably so that the water quality, habitat provisioning, and carbon benefits of seaweed aquaculture can be scaled to help restore our ecosystems and support a net-zero emissions future.

PROJECT LEAD

Tiffany Waters

Global Aquaculture Manager

tiffany.waters@tnc.org

Belize's Golden Seaweed



Belizean seaweed farms are home to

34 & **28**
FISH SPECIES INVERTEBRATE SPECIES

Restorative Seaweed

In Belize, seaweed is the link between conservation and improved local income. With wild fisheries stretched thin, seaweed farming is providing a more reliable alternative or complementary source of income for workers who used to depend entirely on fishing. Shifting livelihoods towards seaweed aquaculture does more than strengthen the local economy; Belizean seaweed farms are home to 34 fish species and 28 invertebrate species, including conch and lobster, and reduce the localized effects of ocean acidification.

To support seaweed aquaculture and its many benefits, The Nature Conservancy Belize has teamed up with U.S.-based company Changing Tastes, local celebrity Chef Sean Kuylen, and the Belize Women's Seaweed Farmers Association (BWSFA). Together, these groups are working to transform the way businesses and consumers think about food.

In March 2023, Changing Tastes and Chef Sean Kuylen conducted a site visit of seaweed farms belonging to BWSFA members located in the crystal-clear Caribbean Sea, off the coast of Placencia. The purpose of their visit was to harvest fresh seaweeds, transport them to a nearby kitchen on the mainland, and conduct a culinary assessment. This unique collaboration between an American chef and a local Belizean chef resulted in the creation of eight possible products derived from seaweeds, including refrigerated or frozen gel cubes, a versatile ingredient that can be used as a thickener in dishes ranging from stews to milk shakes. The success of this project suggests a promising future in developing value-added products derived from seaweeds grown in Belize.

PROJECT LEAD

Seleem Chan
*Mariculture Specialist and
Safety Officer, Belize*

seleem.chan@tnc.org





Restoring Kelp Forests in Chile

An Opportunity for Marine Conservation and Community Prosperity

Restorative Seaweed

Due to a combination of overharvesting and climate change, kelp forests around the world are disappearing rapidly; by some estimates, 60% of kelp forests are in decline. Given the biodiversity and climate benefits provided by the ecosystem, this is an alarming turn of events; kelp forests provide food and shelter for thousands of marine species, and they sequester about 20 times more carbon dioxide per hectare than terrestrial forests.

Along the central north coast of Chile, TNC has partnered with universities, local communities, government agencies, local seaweed companies, and other NGOs to design and implement a kelp forest restoration project. Academic institutions, particularly Universidad Catolica del Norte (UCN) and Universidad Nacional Andres Bello (UNAB), have offered scholarly expertise on the complex workings of kelp forest ecosystems, while government agencies like the Undersecretary of Fisheries and Aquaculture (SUBPESCA) and the National Fishing and Aquaculture Services (SERNAPESCA) have provided guidance for complying with regulations.

In southern Chile, TNC is exploring giant kelp cultivation as a method to remove excess nutrients from waterways. This study, conducted in partnership with the Universidad de Los Lagos and Blumar Seafoods, and funded by the Walmart Foundation, aims to understand how cultivated seaweed can reduce excess organic



matter and sediment in the water column and on the sea floor. Local communities are a crucial part of this effort; residents are actively involved in managing and collecting the seaweed, which strengthens the regional economy and earns trust in the project. Our comprehensive approach, blending practical investigation, technological advancement, and community involvement, positions TNC as leaders in kelp forest restoration in Chile.

PROJECT LEAD

Natalio Godoy
Oceans Scientist

natalio.godoy@tnc.org



Growing Seaweed Aquaculture and Vibrant Rural Communities in Tanzania

Restorative Seaweed

In Tanzania, seaweed farming is socially, economically, and environmentally important; the third largest export industry in the country, seaweed aquaculture supports more than 25,000 farmers, most of whom are women. When farmed responsibly, seaweed can also provide important benefits like water filtration and marine habitat, making it a sustainable alternative to more extractive industries.

OUR IMPACT

283 farmers trained

828 hectares of ocean area under improved management

To support the sustainable growth of the industry, TNC has collaborated with Cargill, C-Weed Corporation, and the government to train seaweed farmers on best management practices that protect the environment and increase productivity. The project was piloted in the villages of Muungoni,

located on Unguja Island, and Tumbe and Shumba Mjini on Pemba Island, where TNC trained 183 seaweed farmers, improving the management of 528 hectares of farms.

Since its first phase, the project has expanded to two additional villages, Fundo and Gando; TNC has trained 100 farmers in these villages, with a target of improving 300 hectares of ocean area by June 2024. After a few months of implementation, there is evidence that these practices are already contributing to higher yields and



incomes, with farmers in Gando reporting that their seaweed harvests have doubled in size. After completing an assessment of areas for expansion, we have identified six more villages to target in the future, with the potential to impact 300 farmers and 500 hectares.

This past fiscal year, we have also prioritized data collection to better inform our efforts on the ground. TNC and our partners conducted a gender analysis and assessment, interviewing more than 500 farmers. This will provide a clearer picture of women's financial independence and leadership in the industry. We also developed a seaweed database of all farmers who have adopted TNC's Best Management Practices of Seaweed Farming, which will streamline the process of tracking the program's progress over time.

PROJECT LEAD

George Maina

Africa Fisheries Strategy Manager

gwmaina@tnc.org



Shellfish Growers Advance Climate-Smart Policy

Low Carbon Future for Aquaculture

An industry dependent on natural elements like temperature, precipitation, and water quality, aquaculture is on the front lines of climate change. Between higher temperatures, sea-level rise, ocean acidification, increasingly severe storms, harmful algal blooms, the influx of invasive species and pathogens, and disruptions to transportation and markets, aquaculture operators are already experiencing climate-related challenges.

As a result, aquaculture operators are advocating for the changes needed to meet global greenhouse emissions reduction targets. In fall 2022, Congress passed the Inflation Reduction Act (IRA), making the biggest ever investment in climate action in U.S. history. The [Shellfish](#)

[Growers Climate Coalition](#), a partnership between TNC and nearly 300 shellfish businesses, advocated for the passage of this essential legislation. Representatives from the coalition and other industry groups met with 18 coastal Senate offices to tell them about how businesses and communities are being affected by climate change and to urge them to take immediate action to mitigate this crisis.

The IRA includes incentives for solar, wind, and battery manufacturing, tax credits for electric vehicles, support for climate smart agriculture, and funding to restore forests and coastal habitats. Together, these provisions will reduce national emissions by an estimated 40% by 2030, bringing us much closer to our goal of halving emissions in the next decade.

Now that the bill has been passed and signed, SGCC will continue working with its partners to advance climate solutions and ensure that shellfish businesses have the support they need to confront environmental challenges.

PROJECT LEAD

Sally McGee

Director of Climate and Strategic Initiatives for the Global Aquaculture Team

smcgee@tnc.org



In Indonesia, Sustainable Shrimp is On the Table

Low Carbon Future for Aquaculture

Indonesia's mangroves are disappearing faster than tropical rainforests and coral reefs at 5,000 to 10,000 hectares per year, mainly to conversion into shrimp ponds. Berau Regency in East Kalimantan is home to 86,043 hectares of mangrove ecosystem, the biggest in East Kalimantan Province. However, in 2019, 11,000 hectares, or 13% of the total, were converted to shrimp ponds, and an additional 54,000 hectares are at risk. If the pond area continues to expand, it will have a severe impacts, not only on the ecosystem but also coastal communities.



In response to the need for sustainable shrimp pond design and better documentation of shrimp pond operations, Yayasan Konservasi Alam Nusantara (YKAN), TNC's affiliate in Indonesia, pioneered the Shrimp-Carbon Aquaculture (SECURE) model. SECURE is part of the Ecosystem Approach to Aquaculture, which

integrates aquaculture activities within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems. As such, SECURE directly addresses the root cause of mangrove loss by working with pond owners to increase shrimp productivity while reconvert up to 80% of shrimp ponds back to mangroves.

Currently, SECURE has been applied in three villages in Berau-Pegat Batumbuk, Suaran, and Tabalar Muara, working with 22 pond owners who operate a combined 238 hectares. About 21% of this area is redesigned for aquaculture, and the remaining 79% is designated for mangrove restoration and conservation.

Farms included in the project have seen improvements in both economic and ecological outcomes. Around 900 mangrove seeds have been planted to restore forests and improve their density; initial observations after 3 months showed positive results, with an 80% survival rate. Additionally, SECURE model ponds have had significantly higher yields compared to previous harvests. In fact, in some cases, the restoration areas see higher productivity than the traditional shrimp ponds, showing that healthy ecosystems and vibrant communities go hand in hand.

PROJECT LEAD

Muhammad Zia Ul Haq

Savu Sea Program Manager

muhammad.ziaulhaq@tnc.org

FROM TOP Checking water quality in nursery area; Aerial view of the nursery in the SECURE model. © Vabian Adriano/YKAN; Pond harvesting in Pegat Batumbuk Village; RIGHT Mangrove monitoring and survey in Berau. © Vabian Adriano/YKAN (all)



A Blueprint for Sustainable Aquaculture Around the World

In May 2023, TNC participated in the United Nations Food and Agriculture Organization (FAO) Subcommittee on Aquaculture meeting in Hermosillo, Mexico. The Subcommittee on Aquaculture is the only inter-governmental body that provides international guidance on the management and regulation and of the aquaculture sector. After six years of effort, members of the Subcommittee approved a set of Guidelines for Sustainable Aquaculture.

More than 50 countries were present and took part in the negotiations. TNC worked with several governments during the meeting, including the United States, Ecuador, and the European Union, and was successful in securing key changes to the text to better reflect the importance of aquaculture as a tool for conservation, ensure effective siting and spatial management approaches, and emphasize the importance of sustainable bivalve and seaweed culture. TNC would like to congratulate the Subcommittee and the countries that took part in the development of the Guidelines for Sustainable Aquaculture; this document will provide critical guidance for aquaculture sustainability going forward.

Robert Jones and Matthias Halwart from the FAO. © TNC



Team Member Spotlight: Yitno Suprpto

As the Aquaculture Coordinator for Yayasan Konservasi Alam Nusantara (YKAN), an affiliate partner of TNC, Yitno Suprpto is responsible for the Shrimp-Carbon Aquaculture (SECURE) project in Indonesia. SECURE is a joint effort between YKAN, local government agencies, and small-scale shrimp farmers to support sustainable shrimp farming practices in mangrove ecosystems. The SECURE program reconverts shrimp ponds into mangrove forests, which can in turn provide natural feed for shrimp and fish and reduce carbon emissions.

Yitno Suprpto works with farmers in Indonesia. © Vabian Adriano/YKAN

Yitno holds an Aquaculture and Marine Resources Management degree from Wageningen University and Research in the Netherlands. Before joining YKAN, Yitno collaborated with more than a thousand small-scale extensive shrimp farmers across Southeast Asian countries, helping them align with international labeling requirements related to environmental and social criteria. He has also led training workshops and offered consultations on environmental and social-gender standards for farmers, processing plants, government officers, and other local organizations throughout Southeast Asia.



Our Team

Robert Jones

*Global Lead
New Jersey, USA*

Tiffany Waters

*Global Aquaculture Program Manager
Washington, USA*

Sally McGee

*Director of Climate and Strategic Initiatives
Connecticut, USA*

Heidi Alleway

*Global Aquaculture Scientist
Adelaide, Australia*

Jonathan MacKay

*Marine Spatial Scientist
California, USA*

Hannah Packman

*Marketing and Communications Manager,
Washington, D.C., USA*

Megan Considine

*Global Aquaculture Program Manager
Puerto Rico, USA*

Lisa Tucker

*Conservation Manager for Aquaculture Investments
Connecticut, USA*

Rebekah Borgert

*SOAR Program Manager
New York, USA*

Antônio Santa Marta

*Shrimp Project Coordinator
Berlin, Germany*

International Program Leads

Ilman Muhammad

*Indonesia Ocean Program Director
Jakarta, Indonesia*

Qing Liu

*China Marine Project Officer
Beijing, China*

Mariana Walther Mendoza

*Gulf of California Fisheries Lead
La Paz, Mexico*

George Maina

*Africa Fisheries Strategy Manager
Mombasa, Kenya*

Julie Robinson

*Belize Program Director
Belize City, Belize*