



From evidence to action: Informing nutrition-sensitive fisheries and improved health in Timor-Leste

Impact Story | Compiled by Kate Langford | 2026

Key points

- Malnutrition and low consumption of aquatic foods remain major challenges in Timor-Leste, particularly for women and young children.
- CSIRO, together with WorldFish and national partners, developed innovative survey tools and generated the first detailed data on aquatic food consumption and nutritional value.
- The methodologies have been adopted by the government of Timor-Leste and the data used to inform national policy and planning.
- Nutrition-sensitive fisheries interventions have been catalysed by this work, aimed at increasing aquatic food consumption among vulnerable groups and improving overall health outcomes.

The Challenge

Malnutrition remains a critical public health issue in Timor-Leste, particularly among women of reproductive age and young children. Poor diet quality is a major contributing factor, and diets often lack animal-sourced foods, including aquatic foods, despite the country's rich coastal resources.

Aquatic foods such as fish, shellfish, and seaweeds are rich sources of nutrients and fatty acids that support health, nutrition, and brain development. Increasing their consumption, especially during the first 1,000 days of life, presents an opportunity to promote optimal growth and development and to break the intergenerational cycle of malnutrition.

Designing effective policies and programs to improve dietary quality and nutrition outcomes requires an understanding of the dietary patterns of different population groups. In Timor-Leste, there is limited data on aquatic food consumption, particularly among women and children and during the critical first 1,000 days. Methods for capturing the contribution of aquatic foods to dietary patterns are further complicated by the wide variety of fish, seaweed, and marine invertebrate species consumed.

CSIRO and partners' response

Improving dietary diversity and nutrition among women and children is a national priority for Timor-Leste. Over the last 10 years, the government has invested in making aquatic foods from coastal fisheries and inland aquaculture more accessible and sustainable, with support from development partners, and promoted the consumption of aquatic foods to diversify household diets.

From 2021 to 2025, the ACIAR project: 'A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia' was led by WorldFish with

CSIRO partnering to provide technical expertise. Through gathering new data on aquatic food consumption and understanding community perspectives of the causes and potential solutions to low aquatic food consumption among vulnerable groups, the project aimed to inform the management of inshore fisheries to maximise nutrition outcomes, especially for women and children.

This impact story focuses on CSIRO's contribution to the project in Timor-Leste in developing innovative survey tools and methods, generating new data on aquatic food consumption and its contribution to nutrition, and identifying interventions aimed at increasing aquatic food consumption.

Key outcomes

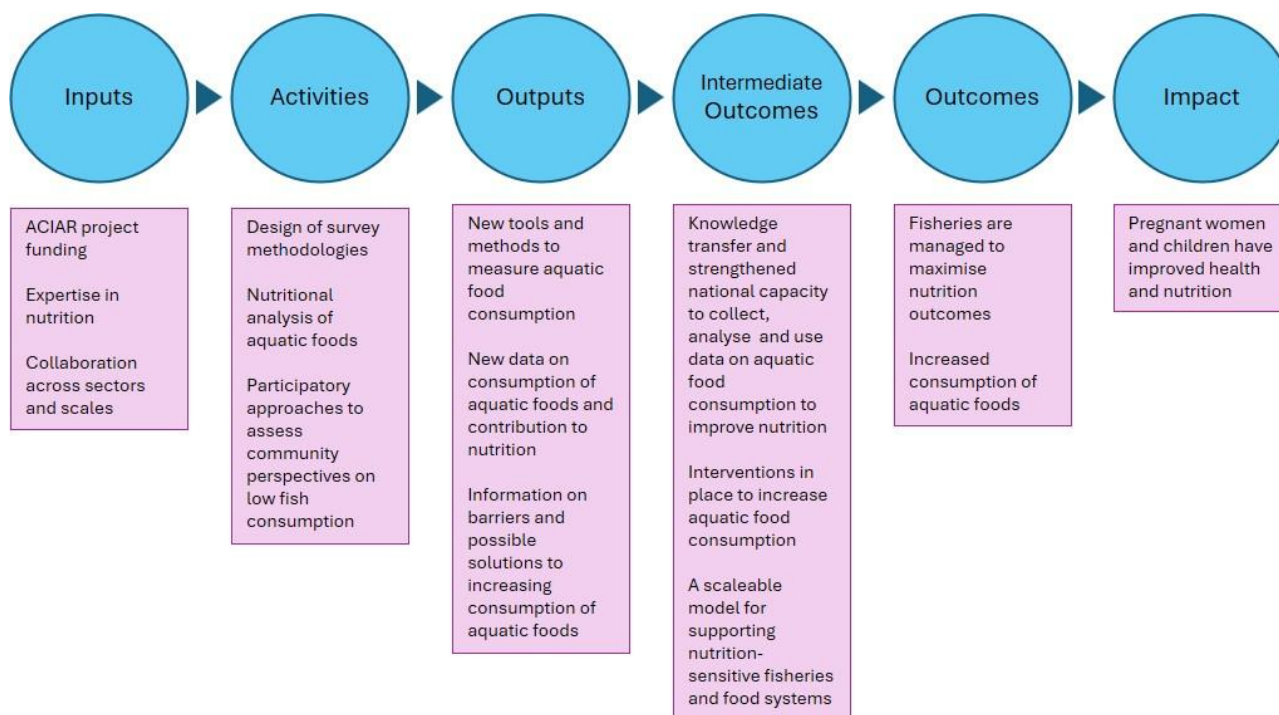


Figure 1: CSIRO impact framework as applied to CSIRO's contribution to this project

Strengthened national capacity to collect, analyse and use data on aquatic food consumption to improve nutrition

CSIRO in collaboration with WorldFish, developed innovative survey tools and methodologies which the Government of Timor-Leste adopted to undertake a National Fish Consumption Survey to determine the average per capita fish/aquatic food consumption in the country and measure progress against their goal of 10kg of aquatic foods consumed per person per year.

Through the project's co-design of methodologies and the inclusion of government staff and students from the Universidade Nacional Timor Lorosa'e (UNTL) in field visits, data collection and workshops, and the sharing of briefs and publications, local capacity has improved in data collection and research methods.

The Timor-Leste Government is using the information collected through the project's initial assessment and their national survey to inform food security and nutrition policies in support of the country's 'Consolidating resources and multi-sectoral action for better nutrition in Timor-Leste (CNAP)' plan. They have showcased the methodologies at a regional level, highlighting their relevance for the broader Asia-Pacific region in understanding the contribution of fisheries to nutrition outcomes for communities.

The project has also increased understanding of what nutrition sensitive fisheries management means in practice. For example, ensuring the sustainable management of habitats that contain nutrient-rich species.

Interventions in place to increase aquatic food consumption

As a result of the participatory processes CSIRO designed to assess local barriers to increased consumption of aquatic foods, several interventions are being implemented to address these. These include improving fisheries management, providing nutrition education to caregivers of infants and young children, training on local fish processing and preparation techniques, and business training to support income-generating activities using aquatic foods.

A scalable model for supporting nutrition-sensitive fisheries and food systems

The research developed and implemented in Timor-Leste was replicated in Nusa Tenggara Timur (NTT) Province of Indonesia, demonstrating that it can be applied in other contexts to improve nutrition outcomes for fishing communities globally. Through knowledge sharing and partnership with Indonesia's National Research and Innovation Agency (BRIN), scientists from CSIRO and WorldFish supported Indonesian counterparts to adapt the methods that were developed and tested in Timor-Leste to the local context in NTT, which faces similar but also unique challenges related to poverty, malnutrition and low consumption of aquatic foods. By adopting this research process, Indonesian collaborators were able to co-develop locally relevant nutrition-sensitive fisheries interventions with communities aimed at improving nutrition outcomes from fisheries management.

How the outcomes were achieved

CSIRO and partner expertise

CSIRO researchers contributed expertise in nutrition-sensitive food systems and public health to develop the tools and methodologies used in the survey and the participatory approaches used to elicit community perceptions about aquatic food consumption. Jessica Bogard's expertise in nutrition-sensitive fisheries and aquaculture research, including previous experience working with WorldFish on methods for measuring fish consumption in South Asia, led to CSIRO being identified as a key partner for the project.

Researchers from CSIRO's aquaculture nutrition group applied their skills in formulating aquaculture feeds to analysing the nutritional qualities of different aquatic foods from Timor-Leste for the project, and researchers from CSIRO IM&T provided support in statistical analysis and data visualisation.

In-country partner WorldFish leveraged existing partnerships and contributed capability in community engagement and facilitation to enable completion of data collection with communities. They also contributed capability in fisheries science and ecology that enabled development of species identification and portion guides.

Collaborations

The project team collaborated across multiple scales—from coastal fishing communities to municipal government staff, and with national policymakers—and across sectors (health, fisheries and education). Collaboration with WorldFish, which has maintained a long-term presence in Timor-Leste, enabled CSIRO to engage through established relationships and to learn effective, context-appropriate approaches to in-country engagement. Building on this foundation, CSIRO facilitated cross-sectoral collaboration between the Ministry of Health (MoH) and the Ministry of Agriculture and Fisheries (MAF), integrating contributions from both portfolios into project research activities and outputs.

The effectiveness of this approach was demonstrated by a request from government partners to develop a training package for national- and municipal-level staff across the health and fisheries portfolios, focused on practical strategies for implementing nutrition-sensitive fisheries management principles. This request represented a significant advance in cross-sectoral collaboration at the national level.

CSIRO further leveraged WorldFish's relationship with the fisheries undergraduate program at the UNTL, delivering mutual benefits by strengthening student research capability and enabling the project to collect samples for composition analysis and extensive species consumption data through student-led fieldwork. In addition, the project team established connections with other ACIAR- and CGIAR-funded projects operating in Timor-Leste, enhancing alignment and knowledge sharing across related initiatives.

Science and technology

New tools for measuring aquatic food consumption

CSIRO in collaboration with WorldFish developed innovative tools and methods to measure aquatic foods consumed by women and children in focal sites in Timor-Leste.

Researchers first conducted a review of current methods used for measuring dietary intakes reported in the literature. The team then developed two visual aids to support species identification and portion size estimation and a technical guide describing the approach. The species identification visual aid that contained photographs of key species consumed was developed in extensive consultation with national and international experts, fisheries officers and communities. The portion size visual aid was developed with information from communities about 'typical' portion sizes for each different type or size of aquatic food.



The species identification and portion size visual aids developed for use in surveying Timor-Leste communities about their fish consumption. Images: Lydia O'Meara 2024.

Using these tools, a survey was implemented in more than 400 households in four focal communities. The survey was conducted twice to account for seasonal differences in aquatic food consumption and dietary patterns between the dry and the wet season.

Nutritional analysis

Samples of 36 aquatic foods (18 species of fish, 12 species of invertebrates, 3 species of seaweed and 3 fish-based processed food products) commonly consumed in Timor-Leste were collected by UNTL students alongside communities from both small-scale fisheries and gleaning fisheries (where women go to harvest seaweed, octopus, small fish, crustaceans etc.). Farmed Tilapia was also analysed in support of government aquaculture initiatives to improve food security.

The edible parts from each species were extracted, mixed up in a blender and the samples frozen or dried on site before being taken to Dili and shipped to Australia to be analysed at CSIRO laboratories in Brisbane. This was the first time local aquatic foods from Timor-Leste had been analysed for nutritional content.

Research findings

CSIRO combined the data collected through surveys on consumption and portion size with information on the nutritional content of each species to generate new information on the contribution of aquatic foods to nutrition in Timor-Leste. The findings were presented back to government in workshops and are currently in publication.

Participatory approaches

CSIRO co-developed a field protocol for implementing the Problem and Solution Tree (PAST) methodology in the four focal communities. PAST is a participatory planning tool used to analyse complex issues by breaking them down into the core problem and its various causes or underlying drivers (Problem Tree), then reversing them into positive, actionable objectives (Solution Tree).

WorldFish implemented PAST with focus groups discussing nutrition issues from the community perspective, possible reasons for these and what actions could be taken at different levels to address them. This led to WorldFish implementing a range of interventions aimed at increasing aquatic food consumption and, by extension, nutrition among communities with a particular focus on pregnant women and children. These ranged from installing fish-aggregating devices to training on fish processing, cooking demonstrations for aquatic foods suitable for young children and information sessions delivered in partnership with municipal health officers.

Looking back: key reflections and lessons learned

The logistics of measuring nutrient composition are challenging. To analyse the nutritional content of aquatic foods for this project, samples needed to be collected and shipped to Australia. Collection proved difficult for species consumed locally that are not available through markets. The collection of invertebrates requires highly specialised local knowledge where availability is highly dependent on seasonal and tidal patterns. The importation of the samples into Australia is also a complex process requiring multiple permits.

Science in resource-constrained environments requires flexibility. The original plan to conduct nutrient sampling across multiple sites proved unfeasible once the team was on the ground. Limited local capacity combined with the logistical challenges of conducting research in a remote setting meant there was a need to adapt to the local context in project design and implementation.

Cultural understanding is important. In Timor-Leste there can be certain food taboos for pregnant and lactating women and other specific population groups. These are often clan-dependant and therefore highly variable but needed to be acknowledged in designing strategies to support improved dietary patterns by communities.

Engagement across sectors took time and had challenges. WorldFish had historically partnered primarily with the Ministry of Agriculture and Fisheries in Timor-Leste, however the project required collaboration across multiple ministries, including fisheries, health and education. Government engagement strengthened over the course of the project as relationships evolved. Cross-sector forums focused on shared areas of work proved valuable in demonstrating the benefits of collaboration across ministries.

Ensuring targets are meaningful. Existing national targets for aquatic food consumption (10kg/person/year) were set primarily based on ecological limits. Multisectoral engagement throughout the project revealed the opportunity to broaden this scope to also consider nutritional requirements in future revisions of the target.

Looking forwards: where to next?

Building on the findings of this work, ACIAR will fund a new 4.5-year project *Strengthening Fisheries for Nutrition*, commencing in July 2026 and led by WorldFish. The project aims to improve nutritional outcomes for vulnerable populations, such as pregnant and lactating women, children under the age of two, and school-aged children in Timor-Leste through increased production, distribution and consumption of safe and nutritious aquatic foods.

CSIRO will lead the nutrition research and associated analyses, drawing on its expertise in nutrition-sensitive food systems and food product development. A core focus will be to strengthen and extend previous efforts on fish-based products and co-develop culturally appropriate, shelf-stable fish-based products designed to deliver nutritional, economic and social benefits for communities. These products will be tailored to the specific needs of nutritionally vulnerable groups and supported by feasible and scalable production models.

The government-supported National School Meals program has been identified as a key entry point for increasing aquatic food consumption. The project will generate evidence on how aquatic foods can be effectively integrated into school meals and responds directly to government requests to develop a nutrition-sensitive fisheries management training curriculum for fisheries and health workers. This will enable national scale-up of practical approaches to improving aquatic food consumption developed in Phase 1 through fisheries and health extension services.

Appendix 1. Summary of projects involved

Project name and WBS	A nutrition-sensitive approach to coastal fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia R-17769
CSIRO team	Jessica Bogard Sinead Boylan Nicholas Bourne Barney Hines Morgan Lewis
Key partners	WorldFish Australian Centre for International Agricultural Research (ACIAR) Ministry of Agriculture and Fisheries(MAF) Timor-Leste, under the Directorate General of Fisheries, Aquaculture and Aquatic Resources Management (DG-PAGRA)
Other key collaborators	Institut de Recherche pour le Développement (IRD) France Universidade Nasional Timor Lorosa'e (UNTL)
Duration/time	1/10/2021 – 31/8/2025

Appendix 2. Knowledge products, publications and additional resources

Knowledge products generated by the project

Ariadna Burgos, Gianna Bonis-Profumo, Imanuel Ximenes, Noviana Simões, Benedetta Longoni, Thijs Schut, Sinead Boylan, Jessica Bogard, David Mills. (11/9/2025). [Gleaning fisheries in Timor-Leste](#). WorldFish.

Bogard JR, Bonis-Profumo G, Ximenes I do R, Alves Almeida CJ, Gomes M, Burgos A and Boylan S. 2023. [Measuring aquatic food consumption in the first 1000 days: An approach to estimating portion sizes in Timor-Leste](#). WorldFish. Technical Report: 2023-27. (Tetum: <https://hdl.handle.net/20.500.12348/6198>).

Bogard J, Bonis-Profumo G, Boylan S, Ximenes I do R, Simoes N F and Mills D. 2024. [Aquatic foods in the first 1000 days of life in coastal communities in Timor-Leste](#). Penang, Malaysia: WorldFish. Program Brief: 2024-57. (Tetum: <https://hdl.handle.net/20.500.12348/6198>).

Bogard J, Bonis-Profumo G, Boylan S, Bourne N, Burgos A, Ximenes I do R, Simoes N F, Gomes M, Hines B, Pereira M and Mills D, 2024. [Nutritional quality of aquatic foods from Timor-Leste](#). Penang, Malaysia: WorldFish. Program Brief: 2024-31. (Tetum: <https://hdl.handle.net/20.500.12348/6200>).

Boylan S, Bogard JR and Bonis-Profumo G. 2024. [Diet quality and aquatic food consumption in Timor-Leste: A scoping review](#). Penang, Malaysia: WorldFish. Technical Report: 2024-06.

Bonis-Profumo G, Schut T, Ximenes I do R, Simões NF, Sarmento AS, Pereira M, Duarte A, Hunnam K, Yaumidin UK, Koeshendrajana S, Ramadhan A, Huda HM, Ariani M, Hidayatina A, Pramoda R, Putri HM, Picauly I, Ninef JSR, Rehatta BM, Adhuri D, Bogard J and Mills D. 2025. [Nutrition-Sensitive Fisheries interventions](#). Penang, Malaysia: WorldFish. Technical report: 2025-54.

Elodie M D Casey, Misa Mojarrabi, Mary T Hannan-Jones, Jessica R Bogard. 2024. [Measuring dietary intake in low-and middle-income countries: a systematic review of the methods and tools for estimating fish and seafood intake](#). *Nutrition Reviews*, Volume 82, Issue 4, Pages 453 – 466. Government of Timor-Leste, FAO and WorldFish. 2025.

[Timor-Leste Fish Consumption Survey TL-FCS](#) (2024/25) - Policy Brief. Dili, Timor-Leste.

Government of Timor-Leste, FAO & WorldFish (2026). [National Fish and Other Aquatic Food Consumption in Timor-Leste 2024-25](#). Dili, Timor-Leste.

Additional information resources

Gianna Bonis-Profumo (WorldFish), Jessica Bogard (CSIRO). Project Annual Report (2023) [A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia](#).

ACIAR website. [A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timur Province, Indonesia | ACIAR](#). Retrieved 24 March 2026.

WorldFish website. [First National Survey Shows Timor-Leste Eating More Fish Than Ever Before | WorldFish](#). Retrieved 26 March 2026.