Australian Government
Australian Centre for International Agricultural Research

Project Annual Report

project	A nutrition-sensitive approach to fisheries management and development in Timor-Leste and Nusa Tenggara Timor Province, Indonesia
project number	FIS/2017/032
period of report	1 September 2022 to 1 July 2023
date due	14 July 2023
date submitted	18 July 2023
prepared by	Dr David Mills (WorldFish)
co-authors/ contributors/ collaborators	Dr Gianna Bonis-Profumo (WorldFish), Dr Jessica Bogard (CSIRO)
approved by	

1 Executive Summary

In 2022-23, the team has made considerable progress towards conceptualising and building the essential blocks for nutrition-sensitive fisheries management in diverse tropical fisheries. A series of methods and tools have been adopted, developed and tested with project focal communities in Timor-Leste (TL), providing new insights into approaches for integrating nutrition-sensitivity into the management of fisheries, to the diverse livelihoods of coastal dwellers, and the diets of coastal households.

As noted in the 2021-22 report, due to administrative issues it had not been possible to sign an agreement with lead Indonesian partner Badan Riset dan Inovasi Nasional – BRIN. This was finally signed in May 2023. A whole-team meeting was held in Dili in June 2023, bringing together team members from Dili, Jakarta and Kupang as well as key stakeholders from the Timor-Leste Ministry of Agriculture and Fisheries (MAF), and the Ministry of Health (MoH). The meeting had a strong training component (nutrition, gender, co-management), and a focus on developing detailed and updated country theories of change, contextualised to the idiosyncrasies of the community, district and national settings in each country. Additionally, the Indonesian team were introduced to tools developed over the first two years of the project in TL. A compressed (2.5 year) research strategy was developed for NTT components, and despite the reduced timeline the research will still parallel that conducted in TL, ensuring valuable comparability.

A suite of innovative tools to measure aquatic foods consumption was developed, field tested and implemented in TL focal sites. Tools include a nutrition survey instrument, two visual aids to support species identification and portion size estimation, as well as a technical guide describing this novel methodology (in late draft). The survey (n=439 households) was implemented twice in TL focal sites to account for dry/wet season differences in aquatic foods consumption and dietary patterns. These tools are set to have considerable impact nationally in TL, with survey methodology and tools being adopted for a nationally representative fish consumption survey of several thousand households in 2024, to be actioned by MAF and the National Statistic Institute, with funding from FAO, and technical backstopping from WorldFish, CSIRO and FAO.

New detailed ecological, social and economic data and information on gleaning was generated through a partnership with Universidade Nacional Timor-Lorosa'e (UNTL). Supported by the project team, students received training in research methods and invertebrate taxonomy, and a group placed in focal communities for 3 months to complete field work for their undergraduate (4th year) thesis. These data provide a unique timeseries and detailed look at how, when, by whom, and for what purpose gleaning is conducted.

Problem and Solution Trees (PASTs) were developed with women and men separately in each TL focal community. PASTs seek to distil the causes of specific nutrition problems within communities from the community perspective and identify potential solutions. These were accompanied by key informant interviews to verify, triangulate and clarify outcomes. Discussions and interviews were recorded and are currently being decoded. The PAST outputs will become the key information for developing nutrition actions in communities as Participatory Action Research (PAR) components are rolled out in Q3, 2023.

From new information on aquatic food consumption and gleaning, a set of priority fish (16 species), invertebrates (12 species) and seaweed (3 species) were selected for nutrient (proximate) analysis. These species were transported frozen by hand by team members to the CSIRO laboratories in Brisbane. Analysis has recently been completed, and data are being compiled and analysed. Due to issues with obtaining export permits, a laboratory capable of conducting similar analysis on Indonesian samples has been identified. Proximate data are key to understanding nutrient contributions from different fish species and types, and therefore key to better incorporating nutrition outcomes in fisheries management.

Moving forwards, in Timor-Leste the team is reorganising to launch the Participatory Action Research (PAR) components of the project (objective 4), building equitable co-management systems with communities, and implementing community plans developed through the PAST activities, livelihood analysis and focus groups. The timely addition of anthropologist Dr Thijs Schut to the Dili-based project team will add depth to this effort and the reporting of lessons. In Indonesia, community profiles have been developed for the two focal communities (in Belu district, West Timor) and first field visits conducted. Field activities will be rapidly rolled out in the Belu sites, and regular interactions and exchanges between country teams will ensure comparability of methods.

2 Reflection on Project Design

2.1 Project research strategy

2.1.1 Responsiveness of research strategy:

As noted in last year's report, the project implementation, and accordingly some aspects of strategy, had to shift substantially due to issues with contracting the Indonesian partners. From the perspective of operations in Timor-Leste, this meant that the major team training activities associated with the planned inception meeting with all partners could not be undertaken, and in Indonesia no progress could be made on implementation. The project launched in Timor-Leste and the missed opportunities for team training were effectively counteracted through the direct involvement of the project experts in implementation. However, the Project Team Meeting that was eventually held once the Indonesian partner agreement was finalised in May-June 2023 in lieu of the Inception Meeting, was extremely valuable for both country teams. A number of the training sessions - notably training on gender and co-management, delivered by Dr Aurelie Delisle from ANCORS (UoW), sharing experience from the ACIAR/DFAT Pathways projects in the Pacific, and co-management training from Dr Dedi Adhuri - were more relevant at this stage of the project than they would have been at the beginning.

The detailed country-level Theory of Change (ToC) process enabled the Indonesian team to better understand how project components were integrated into the overall design, and to identify key actors and pathways with both Kupang- and Jakarta-based team members in the group. For the Timor-Leste team, the ToC process provided a powerful tool to reflect on key actor engagements, and plan the pathways towards maximum impact and sustainability both at the community and government levels.

For the Indonesian team, the meeting was an opportunity for exposure to the approaches and methods adopted and developed in Timor-Leste across the project outcome areas. A series of side meetings between Indonesian team and Timor team members involved in different aspects of the project (e.g., consumption survey, gleaning research, livelihood analysis) provided the forum for transfer and contextualisation of methods. The team agreed that there are no activities that need to be left out entirely from the Indonesian implementation, but that some modifications would be necessary. For example, the nutrition situation analysis will be a rapid assessment and exist only as an internal working document to support project implementation, rather than a published report as initially planned, and as while it was agreed the consumption survey needs to be done across two seasons to understand intra-annual variability, with the available resourcing it will not be possible to survey a fully representative sample for the two focal communities in NTT. A stratified sub-sampling approach needs to be employed.

2.1.2 Activities & outputs:

This project is intensive in information gathering. As the project spans fisheries, livelihoods, and household diets in communities, and attempts to bring them together under the umbrella of co-management, diverse data and information gathering are required to support this action. While information sharing approaches have been successful and provide very valuable input for the Participatory Action Research (PAR) stages of the project, it is clear that some re-sequencing of

activities is necessary. In Timor-Leste various community leaders, members and groups have expressed a feeling that the burden of information sharing has been high, and they are very keen to see some clear evidence of action, and where this work is leading. As a result of this, some of the activities in Timor-Leste have been re-scheduled. While there is still information to be gathered around household livelihood decision-making, and fish-related governance systems (formal and informal) at the community level, there is a clear need to move forwards with the action research components of the project. Additionally, methodology around governance profiles has been adjusted to rely more heavily on key informant interview and expert elicitation rather than focal groups or survey work.

These lessons will be applied in the Indonesian setting as activities are rolled out, however the compressed timeline available for Indonesian activities also dictates that information gathering and PAR activities must be conducted in parallel. An early start to PAR components will be necessary for there to be adequate time to complete at least one adaptive management cycle.

The team meeting in Dili allowed the Timor-Leste team to share methods developed and used for various component of the project with the Indonesian team, and provided the space for joint reflection on how these can be rolled out over an abbreviated time period in Indonesia. The team agreed that there are no activities that need to be cut from the Indonesian implementation, however some will be applied in a ‘light’ format.

2.1.3 Intermediate Outcomes:

Project intermediate outcomes remain appropriate and necessary as high-level markers on the pathway to achieving the end of project outcomes. The May-June 2023 Project Team Meeting in Dili allowed these intermediate outcomes to be further broken down at the country level (separate Ts oC for Timor-Leste and Indonesia) to allow for more detailed planning, particularly relating to key actor engagements and the appropriate communication approaches for these actors.

In the approach to the country level Ts oC we separated out fishery production, nutrition and livelihoods, and governance as separate pathways to desired outcomes, as actors and pathways are quite different in these sectors between the two countries. Once this task has been finalised, a set of new intermediate outcomes at country level will be incorporated into project monitoring.

In the last annual report, we noted that there was some confusion expressed by communities that we were not ‘bringing’ an intervention to the community – the participatory approach employed in this project was new to them, and counter to previous experience with development agencies. Communities are now well engaged with the process of designing interventions, and as such we have navigated this earlier hurdle.

2.1.4 Project Monitoring and Reviews:

The monitoring plan as presented in the project proposal was based around the high-level project ToC. With the development of detailed country-level Ts oC (currently being reviewed and finalised), a new set of metrics will emerge that will be added to the monitoring protocol, and will be particularly relevant for the both the Indonesian activities roll out, but also the co-management formation and PAR components of the project in Timor-Leste.

The intermediate outcome relating to 'new nutritional knowledge being utilised by men and women in communities….' will not be measured directly. While not explicitly described in the project document, the team had envisaged a repeat dietary survey at the end of the project to understand the impact of project interventions on diets. The cost and effort involved in the initial survey dictate that this will not be plausible within the resources of the project. Rather, changes in knowledge, attitudes and practices will be assessed through questionnaires. This approach will also be adopted in Indonesia, commensurate with the compressed timeline for activities.

With the major revision of the ToC undertaken through the Project Team Meeting held in May-June, a Mid-Term Review (MTR) has not been discussed with the RPM at this point. If a MTR is to be undertaken for the project, a major consideration will be the monumental delays in commencing project activities in Indonesia.

2.2 Reflection on gender strategy

Women's fisheries, livelihoods and engagement in child nutrition are at the centre of project activities. Sites were selected based on having active women's fisheries. Engagements with government partners and community so far have strongly emphasised this feature of the project. Engagement from women and women's groups at district and community-level meetings has been strong. The Problem and Solution Tree (PAST) activities relating to childhood nutrition provided particularly strong point of engagement. The key gender challenge for the project is less about the engagement of women in project activities, and more about bringing together management concepts around men's and women's fisheries under the umbrella of co-management, with equitable and empowered representation from women.

The project design looks to use both the 4-step gender outcomes typology (Reach, Benefit, Empower, Transform) and the '5 degrees of inclusion' (Johnson et al., 2021) as a framework for our approach to integration in communities. The outcomes typology has been useful in reflecting on gender outcomes to-date (see section 3.2.1) and will be particularly important in framing activities for the imminent steps of building co-management groups and pursuing the PAR components of the project.

The project design also included using the WEFI (Women's Empowerment in Fisheries Index). In the design process, the senior gender advisor at WorldFish was set to assist with the implementation of this complex tool. As the project started the gender advisor left WorldFish and is only now being replaced. Additionally WorldFish Timor-Leste has just recruited an anthropologist. In Q3 2023 we will review options for using components of the WEFI in association with co-management development and PAR activities.

2.3 Reflection on capacity building strategy

The capacity building strategy of the project remains relevant, and has been actioned successfully in Timor-Leste with partners and next users, and with Timor-Leste and Indonesian research teams. Delays in contracting the Indonesian team necessitated a re-ordering of training activities, but ultimately many of the delayed components were directly relevant to the Timor-Leste team at the current stage of project implementation.

Individual: Due to the delay in the initial capacity building planned as part of the inception workshop, the emphasis on informal learning-by-doing was expanded, with experts in nutrition, gender and ethno-ecology providing direct training and mentoring to the Timor-Leste national team in the processes of rolling out the various activities. The ability of the program to offer individual capacity building opportunities was extended particularly by the presence of Dr Ariadna Burgos in the team, who was able to focus heavily on the project interactions with staff and students at *Universidade Nacional Timor-Lorosa'e* (UNTL). This resulted in six students being trained and placed in communities to collect detailed data on gleaning fisheries (catch, effort,

catch disposal etc). Three of these were at project sites. Students wrote this work up for their undergraduate thesis, and Dr Burgos was heavily involved in support for thesis preparation, and the assessment process. This has greatly strengthened the partnership between WorldFish and UNTL.

Project staff/participants Dr Bonis-Profumo, Dr Burgos, Ms Tarryn O'Leary (New Colombo Plan intern working on governance), and junior Research Analyst Ms Noviana Simões attended a training workshop on gleaning research at James Cook University, supported in part by a Crawford-in-QLD International Engagement Award.

Organisational: The dominant country partnership for Timor-Leste remains the Directorate General of Fisheries, Aquaculture and Marine Resources (DG-FAMR). While capacity and financial support within DG-FAMR remains limited, senior staff have continued to engage with activities particularly at the district and national levels. Three to six DG-FAMR staff attended (at different sessions) the recent Project Team Meeting in Dili, contributing to the country-level Theory of Change. Ministry of Health district officers have engaged very strongly with district and community level activities, and national staff attended the recent Project Team Meeting in Dili and provided meaningful input on how to better collaborate and alignment of outputs.

Institutional: The strengthening of ties with local tertiary institutions (Notably UNTL for this project, although WorldFish has also extended the intern modality of working with students to a private university UNITAL), is an important part of a long-term process of national capacity development. This cohort of undergraduate Fisheries students from UNTL is the first to graduate from what is a new program for this university. Capacity to supervise undergraduate theses has been very limited, and the project provided opportunities for capable students to work with international scientists on their projects. Through this and related projects, WorldFish will continue to build links to fisheries and aquaculture training at tertiary level as well as promoting links with Australian universities with strong fisheries programs. Over time, the objective is to enhance the quality of local teaching, and thereby improve the graduate experience and capacities of graduated students.

The strengthening of engagements with the Ministry of Health provides important components of the platform for activities under Objective 5 of the project, particularly around developing national and regional communities of practice for nutrition-sensitive fishery systems.

2.4 Recommended adaptations to the research strategy

The most consequential change in research strategy relates to the re-sequencing of activities to alleviate issues of research fatigue among community members in Timor-Leste, and to accommodate the compressed implementation timelines in NTT. Both require some adaptation to methods and approaches, but neither will be greatly consequential to project outputs or outcomes. For Timor-Leste, research around governance profiles will now be done separately from, but in parallel with, formation of co-management groups. It will be limited to key informant and snowball interviews with those closely involved with governance, and with longer histories in the fisheries sector. In Indonesia, a reduced dietary survey will use the same tools as in Timor-Leste but the numbers of households surveyed will be below what can be claimed as fully representative for focal communities. Approaches to sub-sampling are being developed.

3 Delivery on project activities, outputs and intermediate outcomes

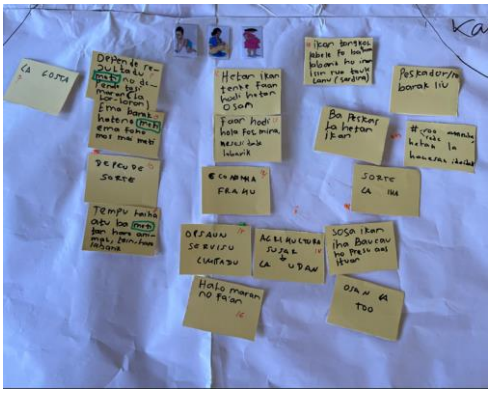
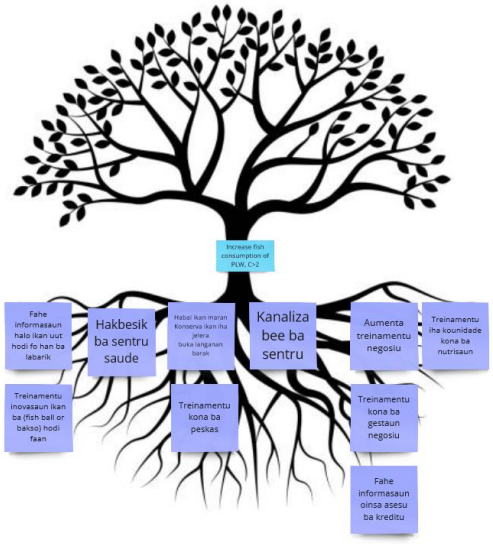
3.1 Activities and outputs

Table 1: Project activity table

No.	Activity	Outputs/ milestones	Completion date
1.1	Inception/training workshop and focus community selection	Detailed, revised research framework and TOC co-produced with all partners with a facilitated focus on gender Yr1, Q2 Detailed M&E indicators and processes/Yr 1, Q2 Country-specific theories of change/Yr, 1 Q2 8 project focus communities selected (6 in TL, 2 in NTT) Yr 1, Q2	Yr 2, Q4 Almost Completed Yr 2, Q4 Underway based on revised ToC Yr 2, Q4 Completed TL Yr1, Q2 Completed in TL NTT, Yr2, Q4 Completed
Comments from previous reporting periods (if relevant)	The year 1 report highlighted the difficulties experienced in contracting BRIN as our Indonesian partner for the project. This effectively took 2 years of project time. A change in site selection approach was outlined in the previous reporting period, with 4 communities selected in Timor-Leste rather than 6. This was because the delineation between 'gleaning' and 'FAD' communities was not clear, and it was agreed that working with gleaners and FAD fishers in a single community would have advantages. This approach was approved by the RPM and continues to prove appropriate. Site selection in Indonesia has followed a similar path. Two sites have been selected that are adjacent to each other and both engage to varying degrees in gleaning and FAD fishing.		
Comments for this reporting period	In April 2023, after a frustrating 2 years of negotiations, a partnership agreement was signed with BRIN to lead project components in Indonesia. This has been possible due to the multi-lateral mode of implementation of this project. WorldFish has contracted BRIN directly, and accordingly the agreement was not dependent on the high-level agreement between ACIAR and the Indonesian Government being signed. I note, however, that there are still considerable risks associated with this partnership. The systems for project funds to be transferred from BRIN to local partners have not been tested, nor have the procurement systems. Due to delays in partnership contracts, much of this work, designed to be associated with the project inception workshop, was delayed until a team meeting could be held with Indonesian partners from BRIN, UNDANA and UKAW (Universitas Kristen Artha Wacana – Kupang) on May 30 to June 2nd, 2023. The research team workshop included gender, nutrition, co-management training as outlined in the proposal, and a number of facilitated sessions on developing a detailed ToC/ToA (theory of action) in each country. The ToC work was facilitated remotely by a team from Royal Rhodes University, Canada, who have been extensively involved in ToC development work for WorldFish and CGIAR. While much of this had been done for Timor-Leste components of the project, the workshop provided the opportunity to align activities across countries to maximise the benefit of the comparative work. Tidying up of the ToC is required to complete this task, and this will be done in the next few weeks. A field trip undertaken as part of the workshop yielded some excellent options for linking communities in NTT and Timor-Leste. A workshop report is in draft –see Appendix 2 for detail on the workshop.		
1.2	Participatory diagnosis of knowledge gaps in areas of seasonal livelihoods, resource and asset dependence	Further development of livelihood analysis tools first used in FIS/2010/097 and adopt recent innovations from the Pacific Gendered livelihood calendars in focus communities Asset maps for focus communities	Y2, Q2 Completed for TL Y2, Q2 Completed for TL Y2, Q2 Completed for TL

Comments from previous reporting periods (if relevant)	In the 2021-22 report, we noted delays in the implementation of this component due to recruitment delays, and additional situation analysis work being undertaken by the team for the ACIAR Timor-Leste food systems initiative.		
Comments for this reporting period	Rapid assessment participatory diagnosis has been completed in the four focal communities in Timor-Leste. Tools used included focus groups on livelihood composition, seasonal livelihood calendars paired with fisheries and gleaning calendars, asset and resource maps, and livelihood transect walks. All tools were applied separately for men and women. Analysis of results from this research is ongoing, and a number of seminars from this research are being given by project staff at the 2023 Timor-Leste Studies Association Research Conference at the UNTL in Dili during the reporting week. The team developed posters with findings from the fisheries and gleaning calendars to share findings with communities in accessible manner and validate results –see Appendix 3 for an example. Methods developed in TL have been outlined to Indonesian partners, and will be rolled out at the Belu, NTT sites in the next few months.		
1.3	Understanding household livelihood structuring, decision making and social differentiation	Internal analysis and working paper on livelihood structures and decision-making. Primary publication on livelihood structuring and decision-making	Y2, Q4 Delayed Y3, Q4
Comments for this reporting period	This research activity has been rescheduled for later in 2023 in TL, as the team has considered that we need to prioritise the implementation of PAR activities identified through co-management groups and from the Problem and Solution Trees, due largely to survey fatigue in project focal communities. Additionally, incorporating findings from the fisheries and gleaning characterisation will enable the team to further tailor the content and structure of the methods designed to complete this household-level research.		
2.1	Nutrition situation analysis for Timor-Leste and NTT, Indonesia	Working paper (based on 2.1.1 and 2.1.2) with identification of key knowledge gaps Report/infographic brief on fish consumption patterns relative the diet	Yr 1 – Q4 Close to completion in TL Yr 1 – Q4 Commenced in TL
Comments from previous reporting periods (if relevant)	The situation analysis activity was modified, as a number of nutrition situation analyses had been completed (including by project post-doc Gianna Bonis-Profumo, who co-authored a broader food systems situation analysis in Timor-Leste as an added objective requested by ACIAR in 2022). Instead, scoping reviews on fish consumption and dietary patterns were deemed as a more useful output to present the state of knowledge on fish consumption and diets in Timor-Leste for different demographic groupings. Dr Sinead Boylan of CSIRO has completed a draft of the scoping reviews.		
Comments for this reporting period	A working paper is under preparation that combines both fish consumption and dietary scoping reviews to highlight available data and knowledge gaps in Timor-Leste. The infographic highlighting findings from the fish consumption survey is under development. Both documents will be published in Q3 2023. The Indonesian team presented an overview of the nutritional status situation in the selected sites in Belu, NTT during the Project Team Meeting. Given the short project implementation timeline for the Indonesian team, it was decided that the scoping review in NTT would be likely not published and developed as an internal report. For the nutrition objective, the priority is to undertake the primary data research activities in NTT, such as the fish consumption survey and the Problem and Solution Trees.		

2.2	Survey of dietary patterns	Standardised tools developed and validated for use Overview of fish species consumed, to ensure appropriate coverage of species in 2.4 Report on dietary patterns of target group with special emphasis on the contribution of fish (filling key knowledge gaps identified in 2.1)	Yr 2 –Q1 Completed for TL Yr 3 – Q1 Completed for TL Yr 3 – Q4 Commenced in TL
Comments from previous reporting periods (if relevant)	Notes included that the design was 90% complete, the Kobo toolbox coding at similar stage, and that an experienced enumerator team had been contracted, leveraging previous household surveys under WorldFish projects.		
Comments for this reporting period	A suit of innovative tools to measure aquatic foods consumption have been developed, field tested and implemented in Timor-Leste, in close collaboration with CSIRO. Tools include a nutrition survey, two visual aids to support species identification and portion size estimation, as well as a technical guide describing this novel methodology (close to publication, undergoing final formatting). The species identification visual aid identifying key species consumed was developed in extensive consultation with national and international experts, fisheries officers and communities. The nutrition survey has been implemented twice to account for seasonal differences in aquatic foods consumption and dietary patterns between the dry and the wet season. The baseline (BL) survey was conducted in September/October 2022 among 439 households across the four project sites. The survey was repeated in March-April 2023 among the full sample, applying a longitudinal research design. CSIRO has conducted preliminary analysis of the BL, some of which was presented at the workshop. This work will be further progressed in 2023/2024 combined with analysis of the seasonal repeat. The development of these tools is set to have considerable impact nationally, as the methodology and tools developed in this project will be adapted for a national Fish Consumption Survey in 2024 led by the MAF and the National Statistics Institute, and funded by FAO, to which WorldFish is providing technical assistance and analytical expertise. For NTT, these tools will be adapted to reflect the local context and implemented in similar months this and next year, likely Q3 2023 and Q1 2024, to also capture seasonal variations.		
2.3	Barriers and enablers for improving fish consumption by vulnerable groups	Journal manuscript on barriers and enablers for improving fish consumption by vulnerable groups	Yr 3 – Q4 Commenced in TL

Comments for this reporting period	The aim of the *Problem and Solution Tree* (PAST) methodology employed for this objective is to use participatory methods to understand and document the causes of specific nutrition problems within NSFM communities from the community perspective and to identify potential solutions. Dr Jessica Bogard (CSIRO), who has used PAST methods previously, worked with Gianna Bonis-Profumo to develop a field protocol for the PAST. Field work was completed for the four Timor-Leste focal communities in June 2023. Over 15 key informant interviews (KII) have been conducted, mainly with local stakeholders, to clarify and triangulate findings on the barriers to aquatic foods consuming among pregnant and lactating women and children under the age of two years. Discussions and interviews have been digitally recorded. The visual PASTs have been captured and entered onto a *Miro* board for each community (see panel below). The field team will re-listen to audio recordings as a quality check to ensure the PAST generated adequately capture the group discussions and to deepen the explanations of the trees developed. This is planned for completion by Q3 2023.    Pictures – Top: Women's group at the Binagua site undertaking the PAST journey together. Left: Group work outputs on causes to the issue. Right: An example of the agreed solution tree at the end of the exercise (in Tetum).

2.4	Nutrient composition analysis	Journal manuscript on nutrient composition of important fish and seafood species in diets of vulnerable groups Data contributed to global database (FAO Infoods, potential new nutrition layer in FishBase) to increase capacity for nutrition sensitive policy development Policy briefs in Tetun and Bahasa on nutrition benefits of gleaning, FAD and other coastal fisheries	Yr 3 Yr 3 Yr 3
Comments from previous reporting periods (if relevant)	Noted the process of developing analysis protocols.		
Comments for this reporting period	The project dietary surveys (2.2), detailed analysis of gleaning fisheries (3.3) and data from the national fisheries system (Peskas - https://timor.peskas.org/) were used to determine a priority group of invertebrate and vertebrate species, covering the most commonly consumed fish and invertebrates from FAD fishing, non-FAD boat fishing, and gleaning. Samples were collected over a number of trips for Australian-based project staff, and samples carried by team members directly to Brisbane. Proximate analysis was completed at the CSIRO laboratory for 16 species of fish, 12 species of invertebrates, and 3 species of seaweed. Farmed tilapia were also analysed to provide an important input to nutrition-based decision making on investments in the fish sector. Raw data are currently being analysed. For Indonesia, it is clear that it is unlikely that the project would obtain export permits for samples within the life of the project. The team has identified a laboratory with the appropriate international accreditations that will be able to undertake most of the analysis in a way that is directly comparable with the CSIRO results at prices substantially cheaper than available elsewhere. Savings made in the BRIN budget due to the reduced timeline for project activities will be redirected to this analysis.		
3.1	Reflective diagnosis of current or previous tenure rights, participation, and catch utilisation from FAD and gleaning fisheries.	Overview of the functioning of FAD and gleaning systems across project focus communities Contribution to a regional (Asia–Pacific) science paper on management of FAD fisheries	Yr 2 – Q4 Underway in TL Yr 3 – Q4
Comments from previous reporting periods (if relevant)	Noted that focus groups at district level had been used to start structuring this research.		
Comments for this reporting period	Data and information have been gathered in the municipal workshops (Viqueque group work, July 2022), through livelihoods groups discussions (December 2022) and the fisheries discussion during the workshop field visit (June 2023). Key informant interviews and expert elicitation will continue alongside project PAR activities. This is one of the components that will be staged differently to the proposal plan due to research fatigue in communities.		

3.2	Assess FAD fishery decision-making, operational dynamics, and pathways to nutrition benefits	New knowledge of pathways to nutrition benefits will feed directly into management pilots in objective 4 Policy brief (Bahasa)[1] highlighting local livelihood and nutrition benefits from inshore FADs, contrasting with past research on offshore FADs Contribution to a regional (Asia–Pacific) science paper on management of FAD fisheries	Yr 2 – Q4 Underway in TL Yr 3 – Q4 Yr 3 – Q4
Comments for this reporting period	In Timor-Leste information of fishing dynamics has been collected through the livelihood discussions with fishers and gleaners as part of community consultation meetings and field visits. The nutrition survey also provided data on household members who fish/glean, frequency of fishing activity, use of catch (consumption, sale, both), importance of consumption at home, FADs use, and vessel types. The field visit during the Project Team Meeting enabled a rich discussion on FAD and gleaning fisheries, further detailing the operational dynamics and decision-making processes of these fisheries. Tracking activities will be undertaken in 2024 in both Timor-Leste and Indonesia.		
3.3	Assess gleaning fishery decision-making, operational dynamics, and pathways to nutrition benefits	New knowledge of pathways to nutrition benefits will feed directly into management pilots in objective 4 Policy brief (in Tetum and Bahasa) on environmental, gendered economic, food security, social and livelihood contributions and risks associated with gleaning With results from activates 1.3, 1.4 (livelihoods) and 2.4 (nutrient analysis), a journal article on the household, nutrition and livelihoods benefits of gleaning	Yr 2 – Q4 Underway in TL Yr 3 – Q4 Yr 4 – Q4
Comments for this reporting period	Dr Ariadna Burgos (WorldFish Visiting Scientist and Marie Currie Fellow from IRD, France) has led extensive work on the characterisation of gleaning fisheries under the project. In addition to the data collected in activities outlined in 3.2, three UNTL students were based in the three gleaning NSFM sites for two months (Sep-Oct 2022) collecting data on gleaning catches composition and weight, interviewing gleaners on uses of catches, and gathering a collection of 183 marine invertebrates (38 bivalves and 145 gastropods), after extensive training by Dr Burgos. This work has provided very valuable characterisation of gleaners (70% women, 66% of males involved are children) and gleaning activities, including catch per effort data.		
4.1	Develop governance profiles and baselines in focus communities	Typology of existing governance and management systems affecting fisheries in focus communities Governance baselines as a key component of project Science paper on institutional re-shaping for nutrition-sensitive fisheries management.	Yr 1 – Q4 Underway in TL and Indonesia Yr 1 – Q4, to be reassessed Yr 4 – Q2 Underway in TL and Indonesia
Comments for this reporting period	In Timor-Leste, the governance work has been re-scheduled and re-imagined due to survey fatigue in communities. JCU New Colombo Plan intern MS Tarryn O'Leary is facilitating this work. This will include key informant interviews, and snowball interviews with fisheries stakeholders to understand existing formal and informal governance systems. Consultant Dr Dedi Adhuri has many years of experience in marine SSF governance, and will provide input into these activities in TL, and lead them in Indonesia.		

[1] This brief is only relevant to Indonesia, as industrial FADs are not used in Timor Leste waters.

4.2	Develop and/or strengthen co-management systems to be nutrition sensitive, gender-inclusive and equitable	Community fisheries management plans co-developed or updated as appropriate in focus communities to strengthen nutrition, gender and equity outcomes Educational materials on the importance of fish in the first 1000 days of life, targeting women, men and diverse groups with policy and health interests	Yr 2 – Q4 Commenced in TL L and Indonesia Yr 3 – Q4
Comments for this reporting period	The process of developing community management plans is commencing with the co-management group formation in the focal communities, and will start in Q3 2023. In all cases there are no existing fisheries co-management plans or formal co-management groups, and co-management is a new concept in communities. The PAST activities in all TL communities recognised nutrition education as an important intervention from the project. Given the broad focus on nutrition security by WorldFish TL, nutrition education materials are being developed across multiple projects.		
4.3	With communities, implement selected interventions from community plans (4.2.1) using a PAR approach	Community implementation and monitoring plans for selected interventions Detailed field notes on pilot implementations, processes, and outcomes	Yr 2 – Q4 Yr 4 – Q1
Comments for this reporting period	The PAR journey with communities will start in Q3 this year. The protocols for forming Community-Based Fisheries Management groups with communities are currently being designed by the team, bringing in past experience in TL, Indonesia and from the WorldFish team in the Pacific. The team will work with the Binagua site on group formation in early August, and the other TL sites will follow.		
5.1	Review relevant research from case study countries and national and regional SSF policies, their effectiveness and potential for integration of inclusive nutrition-sensitive approaches.	Working paper on the current policy environment and potential for integration of nutrition-sensitive approaches as background for activity 5.2	Yr 1 – Q4, updated in Yr 4 – Q1
Comments for this reporting period	Both teams have a strong grasp on the policy taxonomies and environment in their respective countries. A formal review has not been conducted at this point as project activities have focussed on the 'bottom up' components of the research. Formalising this analysis will be important moving forwards and will form an important part of the inter-agency and interdisciplinary conversations moving into the regional dialogues towards the end of the project.		
5.2	Develop detailed theories of action/change for policy impact in Indonesia and Timor-Leste	Theories of action/change for policy engagements in Indonesia and Timor-Leste	Y1, Q4
Comments for this reporting period	The detailed country ToC process undertaken as part of the recent Team Meeting incorporates actors and actions necessary to achieve objectives in the policy arena. Due to vastly differing policy contexts, the policy objectives differ substantially between TL and Indonesia, with an ambition to action national policy change in TL, and to action nutrition-sensitive co-management in focal communities in Indonesia, but with a lesser policy goal of informing a move towards nutrition-sensitive fisheries policy in Indonesia.		

3.2 Summary of progress towards anticipated outcomes

While the Project Team Meeting developed detailed country-level theories of change, the ToC as presented in the proposal remains a useful structure for high-level monitoring of project progress. For this reason, we have presented here progress against outcomes from the proposal ToC.

Table 2: Summary of project outcome information

Intermediate outcomes	Results Summary	Evidence

Women empowered and engaged in co-management across scales	- Women from focal communities involved in fish-based livelihoods have been central in community consultations and group discussions, raising the profile of their fishery activities withing their communities and among national partners. - Project posters and pamphlets produced to feed results back to communities feature gleaning data alongside, and as part of, consolidated fishing data.	- NSFM workshop report (and team report of discussions during field visit to Binagua) (see Appendix 2) - Poster on seasonal calendars on fisheries and gleaning (see Appendix 3 and 4)
Increased capacity among diverse next users to engage in project lessons, tools and guidelines for implementing NSFM	- Continued engagement with Ministry of Health professionals (national, municipal and local) through national and district workshops and community actions, and ongoing discussions of further potential avenues of collaboration. - Multiple DG-FAMR staff have participated in workshops and presentations where project methods have been explained (as part of the national Fish Consumption Survey, below) - Presentations on gleaning during World Ocean Day conference at UNTL with DG-FAMR staff (June 22)	- Municipal workshop briefs (publications) - NSFM team workshop report - World Ocean's Day presentations
Women and men in focus communities using new nutritional knowledge to diversify household diets and prioritise fish as an important food for young children	- Introductory training from project team on aquatic foods for improved nutrition during the PAST activity in all sites - Sharing of results from nutrition BL survey in communities and among seasonal repeat survey participants	- Poster and brochure on most consumed aquatic foods (see Appendix 4 and 5)
Co-developed nutrition solution trees and NSFM plans supported and actioned, engaging women, men and relevant partners across scales	- Problem and Solution Trees have been developed in each site in Timor-Leste, by women and men groups (16 trees in total)	- Currently being refined for presentation. Available next reporting period.
End of project outcomes	**Results Summary**	**Evidence**
Unanticipated outcomes	**Results Summary**	**Evidence**
Scaling of survey tools for national fish consumption survey	The portion size tool developed for the dietary analysis has been picked up for use in a national survey of fish consumption housed by the MAF, funded largely by FAO, and executed by FAO, WorldFish and the National Statistics Institute. FAO has engaged a consultant to lead the survey design, which will be rolled out in 2024.	- Proposal and first round results available next reporting period.

3.2.1 Gender outcomes

The project integrates the 4-step gender outcomes typology ('Reach, Benefit, Empower, Transform') developed through the ACIAR/DFAT Pathways project in the design of change processes for gender inclusion, and to help build the context for empowerment in fisheries co-management. The

project has three areas focusing on gender: highlighting women's livelihoods, fishing practices and knowledge in household food and nutrition security; supporting more equitable SSF governance and outcomes; and capacity building with partners on gender-sensitive approaches and policies.

As introduced in the previous table, the research efforts of this project on characterising gleaning fisheries are not only providing dividends in reaching and empowering gleaners, but also challenging well-established social norms and perspectives of actors in the fisheries sector. Gleanings is done mainly by women and children and is considered a social activity and a means to obtain aquatic foods for free. In Timor-Leste, from the policy to the fisheries government staff and programs and fishing groups, gleaning as a fishery sector has been largely ignored. This project is filling a crucial data gap, as much is yet to be understood on gleaning as a fishery and its contribution to food security, nutrition and livelihoods. Thus, the visibility that the project is bringing to this sector is fostering empowerment to women gleaners that participate in activities and see their contributions quantified and recognised, which is slowly changing perspectives on what defines a fisheries sector and the role that women play in fisheries.

Project activities for 2023/24 will be aiming to benefit women (e.g., through actions to increase their consumption of aquatic foods), as well as empower them (though broader project activities that will support their activities particularly related to gleaning fisheries). Higher level project activities around developing the evidence base for nutrition-sensitive approaches to fisheries management have potential to contribute to 'transforming' gender norms (e.g., related to gleaning fisheries), though these might not be possible to measure/attribute directly to the project within the current project lifetime.

In terms of staffing, a senior scientist (CSIRO), a scientist (IRD) and the post-doc associated with this project are women specialized in different fields, showcasing a strong message of women in science within the national team and among partners and communities. Moreover, the gendered design of this project, where most activities are to be conducted in a gender-disaggregated manner, and the focus of the research involves a typically male domain (boat-based fisheries and FADs) and a female domain (gleaning), necessitates of a gender-balanced national team to engage with communities effectively. This has informed changes to the staffing profile required to implement the project successfully, with the locally recruited team comprising a male and a female.

3.2.2 Capacity building outcomes

It is too early in the project cycle to usefully assess the contribution of capacity building efforts to planned end-of-project outcomes. However, capacity building activities have been effectively delivered and well received. Key activities to-date include:

- Communities: introductory training on aquatic foods for improved nutrition during the PAST activity in all Timor-Leste focal sites.
- Next users (DG-FAMR/MoH): multiple presentations on gleaning and nutrition (project introduction, municipal workshops, World Ocean Day conference at UNTL, project workshop attended by 6 DG-FAMR staff and 1 Ministry of Health staff), and on innovative methods to assess aquatic foods consumption (Fish Consumption Survey meetings).
- UNTL students/interns have been trained in research methods, social, ecological and technological aspects of invertebrate fisheries.
- Project Research Team: The national team members have received training and capacity building through
    - Training sessions on gender, nutrition and co-management provided during the NSFM research partners workshop in May-June 2023
    - Five Timor-Leste team members attended the Crawford JCU gleaning workshop, which included training in various social and ecological aspects of gleaning fisheries, and a workshop on scientific publication (Trainer – Prof Joshua Cinner)

- Two members of the Timor-Leste NSFM team gave seminars on project research at the recent (July 2023) Timor-Leste Studies Association conference in Dili.

3.3 Key Findings/Knowledge generation

The project has made considerable progress towards forming the essential blocks for building nutrition-sensitive fisheries management through activities of the nutrition survey to understand consumption patterns, livelihood research to understand the diversity and integration of systems that support life in coastal communities, the PAST activities to understand community perspectives of the causes and potential solutions to low aquatic food consumption among vulnerable groups, and data on the nutritional value of aquatic foods.

Key findings and knowledge generation relate to both methodologies developed and to research findings. Notably, the team developed innovative tools for (reasonably) rapid but in-depth assessment of the role of fish in diets. This was initiated with a systematic review of current methods used for measuring dietary intakes reported in the literature, and the review has now been published (Casey et al., 2023). Ethnographic and fisheries research was engaged to develop an ID guide for the main species and types of aquatic foods consumed (with local names that vary across relatively small geographic ranges) (see Appendix 6), and an innovative visual tool to assess portion size was developed with information from communities about 'normal' portion sizes with each different type or size of seafood (See Appendix 7).

These tools have generated new data on the role of fish in diets, and on the consumption of fish across different socio-economic and vulnerable population groupings. When combined with the newly received nutrient profiles for commonly consumed aquatic foods, these data will provide a unique window into the contribution of fish to local diets and nutrition. Of particular note, data on the nutrient composition of shellfish, seaweeds and other gleaning catch will provide an unprecedented window into the direct nutrition contribution of gleaning fisheries to households and during the first 1000 days.

Key next steps will be focused on how to translate the wealth of new knowledge generated into meaningful policy and program level solutions to be tested through PAR components of the project.

3.4 Most Significant Change observed by the project team this year

The problem and solution tree (PAST) activity is a powerful participatory methodology used to map and discuss the multiple root causes and potential solutions to a problem. This methodology was used to gather community voices on the causes of low consumption of aquatic foods among pregnant and lactating women and children under the age of two (first 1000 days of life), as well as on solutions that can be implemented at the community level. The first 1000 days, from conception until two years, are an important focus for this project as they are the most vulnerable period of a child's life in terms of nutrition. Aquatic foods are a rich source protein and essential nutrients that are important to brain development and growth, particularly in this stage of life.

In each of the four NSFM coastal rural communities, the research team organised gender-disaggregated focus group discussions to capture women's and men's views on barriers to increased fish consumption. In Timor-Leste, as in many other contexts, women often feel more comfortable to share their thoughts in a group of peers that avoid the social norms that privilege men's perspectives. The activity started with an introduction about the importance of aquatic foods for nutrition and early child development. Then, each group discussed the reasons of inadequate fish and seafood consumption, which was a transformative experience. Participants reflected that despite the seasonal abundance of aquatic foods in these fishing villages, many did not know about the nutritional benefits of fish for young children and their mothers nor the importance of eating a balanced diet. Both men and women groups identified community-based trainings on nutrition as one of the solutions that could help address the problem.

Among other activities, the NSFM team is now organising the delivery of sessions on aquatic foods for improved nutrition in partnership with municipal health officers from the Ministry of Health. Each community identified different avenues for these trainings. For example, some asked to accompany these with practical cooking demonstrations on how to add fish safely to the traditional rice porridge fed to young children, as bones are a major concern. Some women groups suggested the local health clinic as the desired location for the sessions, while men groups often preferred the community hall. Adapting the trainings to the communities' and groups' ideas gathered through the PAST activity will be key to ensure their success and support better nutrition in communities that base their livelihood in marine resources.

Photo captions: Women's and men's group discussion during the Problem and Solution Tree activity in Com community, Lautem municipality in Timor-Leste, May 2023.
Photo credit: Gianna Bonis-Profumo.

4 Partnerships

Key partnerships in the project encompass research team partnerships (including the south-south Timor-Leste – Indonesia connection), and external partnerships with next users and end users.

In the 2021-22 report we highlighted the ongoing issues with actioning the key research partnership with BRIN, Indonesia. Activating this partnership continued to take a disproportionate effort from both project team members, and administrative, legal and business development staff from WorldFish HQ until completed in May 2023. As noted elsewhere, the BRIN project team were critical to this process, and were key actors in persevering to eventually get the project agreement across the line.

Assisted by project consultant Dr Adhuri, the team quickly made high quality links with tertiary institutions UNDANA and UKAW in Kupang, and very quickly developed strong nutritional and natural resource profiles for the two focal communities in NTT. Provided that hurdles associated with BRIN financial processes can be navigated, we are confident the Indonesian team will be very capable contributors to both Indonesian and Timor-Leste components of the project.

The relationship with the Fisheries undergraduate program at UNTL continues to grow strongly, supported by the WorldFish country program, but with the highest level of engagement and investment coming from this project. Project staff engagement in student thesis project and in research training has provided dividends both for the project (in terms of data on gleaning fisheries) and for the quality of training at UNTL.

The project partnership with CSIRO, including with nutrition experts (Dr Jessica Bogard, Dr Sinead Boylan) and the nutrient analytical laboratory staff has been central to nutrition training, nutrient analysis and the problem and solution tree activities.

In Timor-Leste, partnership with DG-FAMR is functional, and builds on the existing long-term partnership with WorldFish. DG-FAMR staff remain engaged in higher level meetings and senior staff (including the Director General) clearly see the project as an important component of their engagement with communities. We are increasingly building the relationship with DG-FAMR staff at the district level as this will become critical as the project shifts towards PAR implementation. This is being achieved collectively with a number of other projects, notably ACIAR Fish Innovations (FIS-2019-124) and the CGIAR program on Resilient Aquatic Food Systems (through Work Package 2 on innovative partnerships). Relationships with DG-FAMR have improved steadily in recent years under a consistent group of senior staff including the Director General, and the National Directors of key directorates such as Fisheries Management, Monitoring Control and Surveillance, and Research. However, a recent change of government is likely, in the few weeks following this report, to result in a wholesale reassignment of senior roles. This is likely to present new challenges and require a focussed period of rebuilding.

5 Risk Management

Project implementation

Partnerships: As noted, negotiating a project agreement with Indonesian research partner, BRIN, took over 2 years. This was entirely due to political and institutional re-shaping of the national research apparatus at the Indonesian end. The Indonesian research team showed great stamina to get this through a very overweight administrative system (e.g., One Zoom meeting regarding contract wording had 37 participants from the Indonesian end, and 3 from the WorldFish side). Once the agreement was signed, the project team meeting in Dili was very successful, and we have great confidence in the Indonesian team, although the WorldFish budget assumed more of the costs than originally planned. However, quite a number of questions remain about implementation – particularly relating to fund use and disbursal. Processes of procurement and contracting from the BRIN side remain opaque, and the team remain less than confident about processes.

Foreign Exchange Losses: Operating almost entirely in a USD economy (with the exception of the partner (CSIRO, BRIN) agreements, which were contracted in AUD), the project has taken a substantial hit from foreign exchange fluctuations. Current estimates are a decrease in the project budget of AU$150,000 - equivalent to the entire field operating budget for the project. Looking forward, this will create substantial difficulties with project implementation. The PL has arranged a time with the RPM to discuss this issue.

Community fatigue: The project is heavy on participatory research methods and data collection. Survey/meeting fatigue have been apparent among focal communities through recent months, while there are additional focus groups and key informant interviews that still need to be conducted. We have re-organised the order of some activities so that action research items with community groups are brought forwards. This will give the communities confidence that the project won't just be extractive.

Political landscape: A parliamentary election was held in Timor-Leste on the 21st of May 2023. The outcome has been a change of government. It is likely that this will precipitate changes among the senior staff within the Ministry of Agriculture and Fisheries, the Directorate General for Fisheries, Aquaculture and Marine Resources, and the Ministry of Health. While we have received strong support to-date from these key partners, this is not assured moving forwards. At the time of writing, the team was waiting to hear about the new appointments within the two key ministries. The WorldFish program relies extensively on these connections, and as such the weight of reestablishing trusted connections does not fall entirely on this project.

In Indonesia, there will be an election in February 2024. Given the politicised nature of the establishment of BRIN, we have been told that there is a possibility that BRIN may be immediately abolished if there is a change of government. The implications of this are not predictable at this point.

Next user risks

None identified at this stage.

6 Appendices

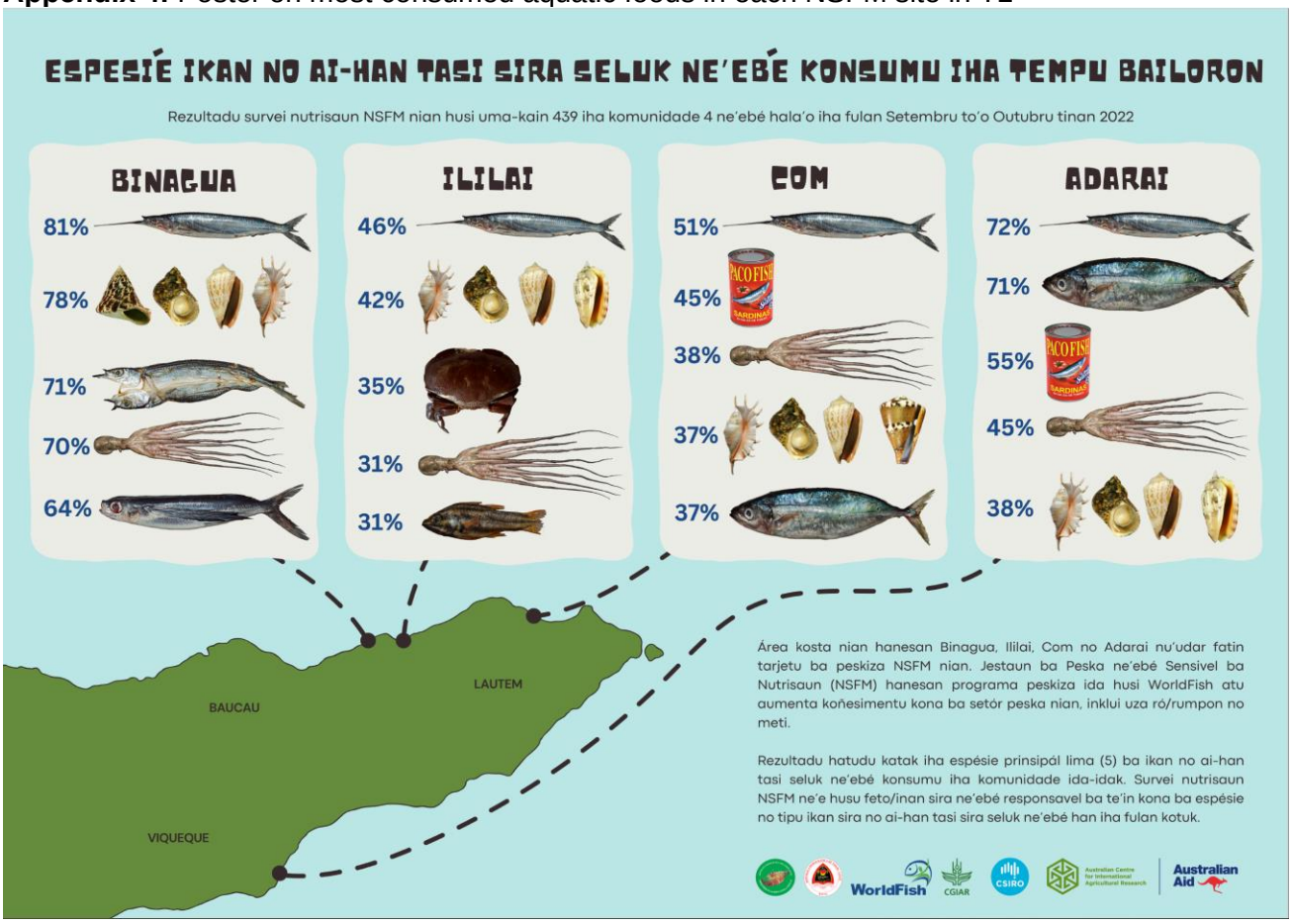
Appendices offer an opportunity to provide additional information that otherwise might not be reported elsewhere. A good example is tabulating unpublished data in a way that others can use in the future, or providing more detailed descriptions of methodologies (e.g., a survey form).

Appendix 1: Publications list

Appendix 2: NSFM research project partners workshop report (draft attached)

Appendix 3: Poster on fishing and gleaning calendar to communicate results with the community and allow for feedback/correction, example from Binagua site, TL

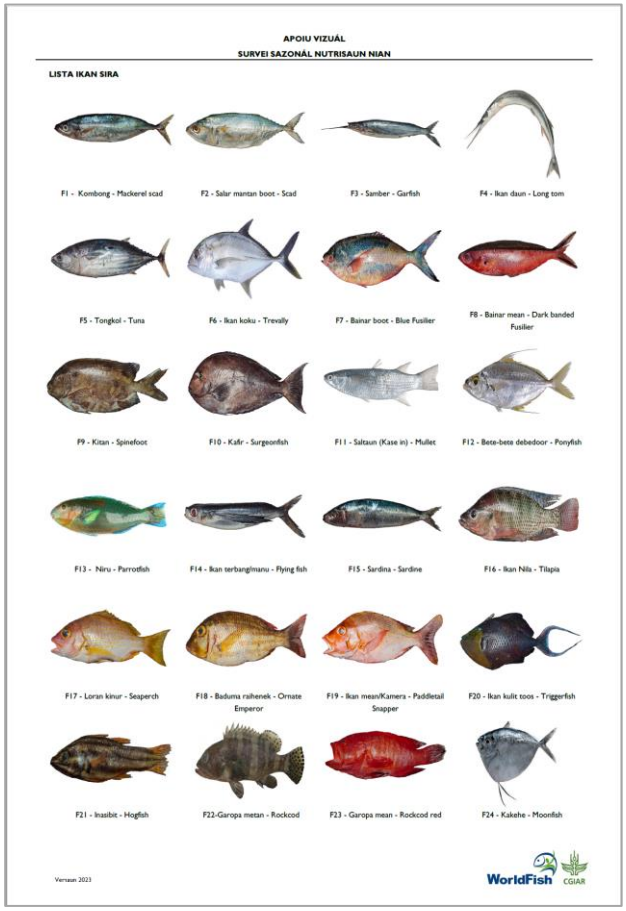
Appendix 4: Poster on most consumed aquatic foods in each NSFM site in TL



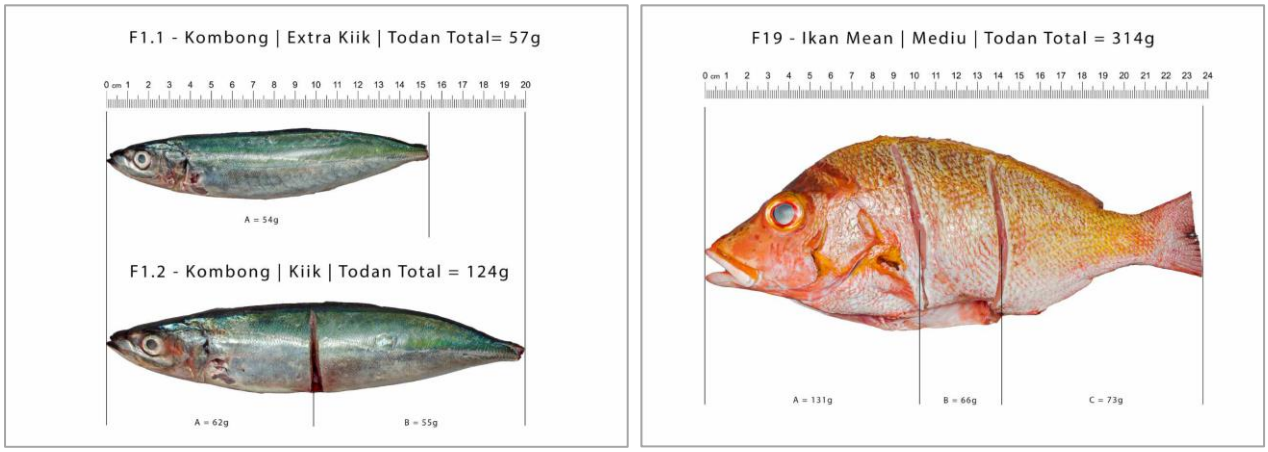
Appendix 5: Pamphlet with results from nutrition survey given to seasonal survey respondents

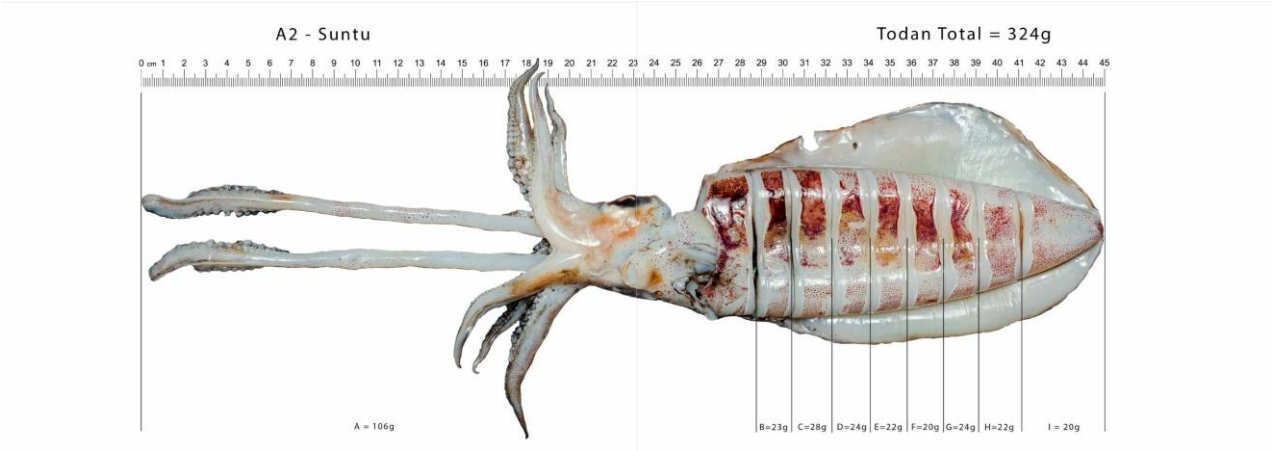
Note, other side includes the image from Appendix 4.

Appendix 6: Visual aid 1, species identification



Appendix 7: Visual aid 2, portion size (some examples only)





Appendix 8: Personnel table

Project member	Institution	Comments
Dr David Mills	WorldFish	Project Leader
Dr Sinead Boylan	CSIRO	Nutrition specialist – maternity leave replacement for Dr Jess Bogard (all 2022)
Dr Jessica Bogard	CSIRO	Senior Nutrition Scientist (back in 2023)
Dr Gianna Bonis-Profumo	WorldFish	Project post-doc/ consultant. Based in Dili Mar 2022-23, now Australia-based
Dr Thijs Schut	WorldFish	Anthropologist – Dili based, recently recruited and joining the team in Sept 2023
Mr Mario Pereira	WorldFish	Co-management Officer
Dr Ariadna Burgos	IRD/WorldFish	3-year Marie Curie Fellowship to work in association with the project on invertebrate fisheries
Mr Imanuel do Rosario Ximenes	WorldFish	Research Analyst
Ms Noviana das Dores Faria Simões	WorldFish	Research Assistant consultant
Ms Tarryn O'Leary	WorldFish	JCU/New Colombo Plan Intern focusing on governance
Dr Dedi Adhuri	Consultant	Anthropologist with extensive experience in fisheries co-management systems
Prof Sonny Koeshendrajana	BRIN	Leader of BRIN team – socio-economist
Andrian Ramadhan	BRIN	Socio-economic researcher
Hakim Miftakhul Huda	BRIN	Marine resources management researcher
Radityo Pramoda	BRIN	Policy researcher
Tenny Apriliani	BRIN	Marine resources management researcher
Jotham Siprianus Ninef	UNDANA	Marine resources management researcher
Beatrix Maureen Rehatta	UNDANA	Fisheries researcher
Intje Picauly	UKAW	Nutrition researcher

Appendix 9: Annual Budget
Provide a summary of expenditure and discuss any significant variations from approved budget during the reporting period (maximum ½ page).

Appendix 10: Intellectual Property
No significant protectable intellectual property has been generated in the project to-date