

Evaluation Report for Aquaculture Development in Timor Leste 2020 – 2023

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Date: 28th October, 2023 (Final version)

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Acronyms & Abbreviations

ADD	Activity Design Document
FFS	Farmer Field School
FTE	Full-Time Equivalent
GDS	General Directorate of Statistics (Timor Leste)
GIFT	Genetically Improved Farmed Tilapia
GoTL	Government of Timor Leste
ha	Hectare
HH	Household
IAA	Integrated Agriculture & Aquaculture
kg	Kilogramme
MAF	Ministry of Agriculture and Fisheries
MDD-W	Minimum Dietary Diversity of Women of Reproductive Age
MDD-IYC	Minimum Dietary Diversity Infant and Young Children
MDF	Market Development Facility
MFAT	Ministry of Foreign Affairs and Trade (New Zealand)
NADS	National Aquaculture Development Strategy
NAF	National Aquaculture Forum
NDA	National Directorate for Aquaculture
NDFA	National Directorate for Fisheries and Aquaculture
NGO	Non-Governmental Organisation
NZ	New Zealand
NZD	New Zealand Dollar
OECD-DAC	Organisation for Economic Cooperation and Development - Development Assistance Committee
PADTL	Partnership for Aquaculture Development in Timor Leste
PPP	Public Private Partnership
SME	Small and Medium Enterprise
SRT	Sex-Reversed Tilapia
t	tonne
ToR	Terms of Reference
USAID	United States Agency for International Development
USD	United States Dollar



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Exchange rate used: USD 1 = NZD 1.5706



1. Abstract

The purpose of the evaluation of Participatory Aquaculture Development in Timor Leste 2 (PADTL2) is to identify improvements that can be made to the management and implementation of the Activity over the remaining two years of implementation in order to enhance the results.

The evaluation methodology concentrates upon the key questions included in the Evaluation Matrix. A rapid review of project progress reports and documentation took place, after which initial briefings were held with Stakeholder Group members in Dili. Field visits were then undertaken to the six municipalities to interview clusters of fish farmers and other beneficiaries such as hatcheries, inputs suppliers and fish traders. Once the field work was completed, the preliminary results were presented to the Stakeholder Group during the Project Management Committee meeting held in Dili on 1st August 2023.

Main findings and conclusions are that implementation of PADTL2 was delayed by 18 months due to COVID-19 and even with a twelve month No Cost Extension, it is unlikely most output and outcome indicators will be met, or the remaining budget spent. Furthermore, the envisaged widespread adoption and scaling up of PADTL2 activities by other donor partners has not taken place.

Nevertheless, tilapia production is commercially viable and the cluster-based business model has proved effective in providing essential private sector linkages to inputs and markets. However, tilapia is not an affordable source of nutrition for poor households in Timor Leste and the nutrition strategy is flawed.

It is recommended the next phase of the project focuses upon scaling-up to include more beneficiaries and increased tilapia production in the existing municipalities through partnerships / sub-contracts with International Non-Government Organisations, using the cluster based model developed by PADTL2.



2. Executive Summary

The purpose of the evaluation of Participatory Aquaculture Development in Timor Leste 2 (PADTL2) is to identify improvements that can be made to the management and implementation of the Activity over the remaining two years of implementation in order to enhance the results.

Main conclusions are that implementation progress has been delayed due to COVID-19 and even with a No Cost Extension (NCE), it is unlikely most output and outcome indicators will be met. It is also unlikely the remaining budget will be spent before the end of the NCE. Project monitoring and reporting against output and outcome indicators has not sufficiently 'red-flagged' these issues allowing the Ministry of Foreign Affairs and Trade (MFAT) to take remedial action.

The project design envisaged widespread adoption and scaling up of PADTL2 activities by indirect beneficiaries and other donor partners, which have now lost interest in tilapia. It is likely there will be very little funding for tilapia after MFAT funding has concluded.

Cost effectiveness regarding investment per direct beneficiary or kilogramme of fish produced during PADTL2 is not excessive, however, this does not consider the 'sunk' costs of the investments made for the same beneficiaries during PADTL1.

Tilapia production is commercially viable and the cluster-based business model provides essential private sector linkages to inputs and markets. However tilapia is not an affordable source of nutrition for poor households and the nutrition strategy is flawed. Tilapia production can be inclusive for women due to workload balance with traditional household duties; and youth, due to attractive returns on labour.

No Exit Strategy has been prepared and sustainability is at risk as the cluster business model is anchored to the MAF broodstock hatchery at Gleno, which is under financed. There are also concerns regarding the financial viability and sustainability of the PPP hatcheries.

Recommendations are to immediately prepare a workplan and budget for the remaining years of project implementation, revise performance indicator targets, include 'progress towards outcomes' in reporting and integrate an Exit Strategy in the workplan to ensure sustainability.

The next phase of the project must focus upon scaling-up to include more beneficiaries and increased tilapia production. It is recommended WorldFish seeks partnerships / sub-contracts with International Non-Government Organisations to implement the expansion, based on the cluster business model, Best Management



Practices extension materials developed by PADTL and continued use of interns and Field Facilitators to provide a strong field presence. Existing clusters are encouraged to increase membership and new clusters are established in Dili, Bobonaro, Lautem, Ermera and Baucau municipalities which have closer proximity to markets as production increases beyond local consumption needs. Existing clusters are strengthened by establishing a new Public Private Partnership hatchery in Baucau and a marketing strategy is developed by PADTL2 to target the traditional wet market segment.

Lessons learned are that tilapia farming in Timor Leste is primarily an income generating activity. A key factor for success are clusters to aggregate smallholders and facilitate essential input and market linkages. The use of pelleted feeds, rather than on-farm made feeds, has enabled the move towards commercial production, which then requires linkages to urban consumer markets. As such, cluster development needs to start at where consumption is (urban areas) and work backwards from there, rather than establishing clusters in isolated locations and then seeking markets.



3. Background

THE ACTIVITY

The 'Aquaculture Development in Timor-Leste' Activity (PADTL) has been funded under New Zealand's International Development Cooperation Programme since 2014, with total expenditure to date of NZD 8.9 million. The goal of the Activity is to enhance food and nutrition security and improve livelihoods of rural households through sustainable aquaculture development.

This phase of the Activity (2020-2023) is in its third year of implementation. The implementing partner is WorldFish, an international non-profit research institution that has staff based in Dili within the Ministry of Agriculture and Fisheries (MAF), and also draws on visiting experts.

The approved Business Case provides for an evaluation in year three to inform the Ministry of Foreign Affairs and Trade (MFAT) decision whether a further two additional years of support (at reduced levels) is necessary.

EVALUATION PURPOSE AND DESIGN

PURPOSE

The purpose of the evaluation is to identify improvements that can be made to the management and implementation of the Activity over the remaining two years of implementation in order to enhance the results.

SCOPE

The evaluation covers the time period from the beginning of the current phase (April 2020) until present. It focuses on all aspects of implementation including project management arrangements as well as assessing progress towards achievement of outputs and outcomes.

The target groups are the implementing partners (WorldFish), the National Directorate for Aquaculture (NDA) c.f. Timor-Leste Ministry of Agriculture and Fisheries (MAF) (Ministerio Da Agricultura E Pescas), Private Sector (Private Partnership Hatcheries) and other key stakeholders. The scope of the evaluation excludes the technical expertise of the implementing partner.

DESIGN

The Evaluation Matrix is the core evaluation tool. The project Results Measurement Table summarises project outputs, as well as short, medium and long-term outcomes, and provides indicators and sources of data to be used for monitoring and evaluating performance metrics. The Evaluation Matrix is informed by this.

The evaluation concentrates upon the key questions included in the Evaluation Matrix and focuses upon implementation progress (effectiveness), cost



effectiveness (efficiency), sustainability, adaptive management due to the COVID-19 pandemic, and likelihood of achieving the planned long-term outcomes (impact). Areas of investigation include access to feed and seed and farmer production levels; market linkages, income and employment; nutrition; and knowledge dissemination. Cross-cutting issues such as gender sensitivity and inclusivity of marginalised and vulnerable groups are also assessed.

During the first phase of the evaluation a rapid review of project progress reports and documentation took place (See Appendix A). After initial briefings with Stakeholder Group members in Dili, meetings were held with other relevant donors such as United States Agency for International Development (USAID). Field visits were then undertaken to the six municipalities to interview clusters of fish farmers and other beneficiaries such as hatcheries, inputs suppliers and fish traders.

Once the field work was completed, the preliminary results were presented to the Stakeholder Group during the Project Management Committee meeting held in Dili on 1st August 2023. The Draft Evaluation Report was prepared based upon feedback received during the presentation.



4. Overarching Findings

The evaluation findings are classified under the Organisation for Economic Cooperation and Development - Development Assistance Committee (OECD-DAC) evaluation criteria of effectiveness, efficiency, sustainability and impact. Gender and youth inclusivity are also assessed.

4.1 Effectiveness

Objective 1: to examine the progress being made in achieving the Aquaculture Development in Timor-Leste Activity outputs and short and medium term outcomes.

Table 1 summarises the latest fish farmer cluster data referred to in the Results Measurement Table.

Table 1: Fish Farmer Clusters

Municipality	Cluster	No. Households	Female	No. Ponds	Area Ponds (m ²)
Baucau	Gariuai	15	9	22	4,610
Baucau	Goa7	31	1	20	4,764
Baucau	Ossoguigui	15	0	9	1,755
Bobonaro	Balibo	34	8	55	3,614
Bobonaro	Batugede	38	20	63	6,215
Bobonaro	Leohito	69	27	111	12,701
Ermera	Fatuquero	10	1	22	1,607
Ermera	Laubono	28	4	48	5,611
Ermera	Poetete	14	0	33	1,513
Lautem	Parlamento	30	6	90	9,261
Lautem	Los Palos	20	5	20	14,307
Dili	Hera	10	0	28	710
Manufahi	Colocau	25	3	50	15,000
6	13	339	84	571	81,668

Source: PADTL2 records (July 2023)

PADTL2 now covers six municipalities with 13 farmer clusters made up of 339 households. Some farmers have more than one pond and the total area of ponds is 8.17ha. Average pond size is small at only 143m².

4.1.1. What progress has been made in achieving intended outcomes and outputs, as outlined in the annexed Results Measurement Table? To what extent are the results achievable? And if not what needs to change?

The Results Measurement Table provided in the most recent Activity Progress Report (Oct 2022 – Mar 2023) is presented in Appendix B. To summarise, key



output indicators are shown in Table 2, which also includes some of the most recent monitoring data collected by PADTL2.

Table 2: Key Output Indicators

Output Indicators	Planned	Actual
Number of PPP GIFT hatcheries.	1 Government & 4 PPP hatcheries established supply 8 million fingerlings a year.	Gleno (MAF), Leohitu, Parlamento, Hera (USAID) and Colucau hatcheries produced 2.1 million SRT fry (Apr 22-Mar 23).
Volume of imported pelleted feed.	400 tonnes of feed a year imported and sold to farmers @ <\$1.25/kg.	146.4 tonnes of feed imported. Average farmer purchase price = \$1.50/kg (Apr 22 – Mar 23).
Area of ponds / No. municipalities.	80ha of ponds in 12 municipalities under direct and indirect beneficiary management.	8.17 ha under direct beneficiaries (latest data). Number of indirect beneficiaries are not recorded.
Annual tilapia production (t/ha).	600 tonnes/year from direct and indirect beneficiaries.	32.5 tonnes under direct beneficiaries (Apr 22 – Mar 23). Number of indirect beneficiaries are not recorded.
Households raising tilapia.	500 direct beneficiaries 1,000 indirect beneficiaries.	339 direct beneficiaries (July 2023). Number of indirect beneficiaries are not recorded.
No. farmer clusters with linkages to market	10	13 (July 2023)

Source: Activity Progress Reports Apr 2022-Sep 2022 & Oct 2022- Mar 2023

As can be seen from Table 2, most of the 'actual' achieved targets are below the 'planned' targets, particularly regarding indicators of 'scale', such as area of ponds (10%), number of sex-reversed tilapia (SRT) fry produced by the hatcheries (26%), feed imports (37%) and annual fish production (5%). However, the 'planned' targets included indirect beneficiaries which have not been included in the 'actual' count, as these are not recorded in the project's monitoring system.

The number of indirect beneficiaries included in the Results Measurement Table are extrapolated based upon the number fingerlings produced by the GIFT hatcheries. This is not considered reliable data by the Evaluation Team as destinations and survival rates are unknown and the fingerlings could be random one-off purchases by donor projects.

Production efficiency parameters are also recorded and compared to industry standards. For example, based on pond data collected by the Field Facilitators, the average tilapia yield is 12.4 tonnes/ha per cycle which is much higher than the planned yield of 5.5 tonnes/ha. The survival rate is estimated at 99 percent, which is much higher than the 75 percent planned survival rate. The Feed Conversion Ratio (FCR) is estimated at 1.02, which is very good. Ideally the production cycle



would be less than six months, allowing two cycles a year but this data is not available.

Table 3 shows the two main outcome indicators. Increased household income is not being directly measured by PADTL2. The Results Measurement Table compares average income from tilapia production for a direct beneficiary household against average national per capita Gross Domestic Product. This is not considered a reliable methodology by the Evaluation Team. Nonetheless, direct beneficiaries produced USD 130,000 worth of tilapia between April 2022 and March 2023 (Activity Progress Reports).

Increased employment is unlikely to be significant in terms of 'Full-Time Equivalent' days, as it is a part-time activity for producers and Local Service Providers (LSP).

Table 3: Outcome Indicators

Outcome Indicators	Planned	Actual
Increase in household income from tilapia production	15-20% increase in income.	Not known.
Fish consumption by women & children	20% increase in MDD among women and children participating in project activities.	MDD-W = plus 7%. MDD-IYC (6-23 months) = minus 29%. MDD-IYC (24-59 months) = minus 2%.

Source: Nutrition Endline Survey (July 2023), Mercy Corps

The Minimum Dietary Requirement (MDD) measures dietary quality through the diversity of food groups consumed.² For a 'good' Minimum Dietary Requirement for Women of reproductive age (MDD-W) the minimum score is 5 out of 10 food groups consumed. For a 'good' Minimum Dietary Requirement for Infants and Young Children (MDD-IYC) aged 6-23 months, the minimum score is 5 out of 8 food groups consumed. For a 'good' MDD-IYC aged 24-59 months, the minimum score is 5 out of 8 food groups consumed.

Mercy Corps carried out a nutrition baseline survey in October 2022 and an endline survey nine months afterwards in July 2023, which is a short period to expect significant social and behavioural change. The sample was of beneficiary households, which only shows changes amongst households which consume some of the fish they produce and excludes the wider population who have to buy fish to improve their nutrition. Table 4 shows the baseline and endline survey average MDD scores.

² MDD food groups for adults includes (1) grains, roots, tubers, plantains; (2) pulses, such as beans, peas and lentils; (3) nuts, seeds; (4) dairy, excluding flavoured and sweetened milk; (5) meat, poultry, fish; (6) eggs; (7) dark leafy green vegetables; (8) other vitamin A-rich fruits and vegetables; (9) other vegetables; and (10) other fruits.



Table 4: Baseline and Endline Average MDD Scores

Average MDD Score	Baseline	Endline	% change
MDD-W	4.4	4.7	7
MDD-IYC (6-23 months)	3.8	2.7	(29)
MDD-IYC (24-59 months)	4.6	4.5	(2)

Source: Nutrition Endline Survey (Jul 2023), Mercy Corps

The average MDD scores improved for MDD-W but worsened for MDD-IYC, which could have been due to seasonal factors and related food availability. The Endline Survey is inconclusive regards the impact of tilapia production on nutrition as the MDD methodology is based on diversity of food groups consumed, not just fish consumption.

Nonetheless, the surveys concluded at least one person in a household consuming any type of fish at least once a week rose from 54 percent at baseline to 71 percent at endline. The number of households which had consumed tilapia in the previous week increased from 73 percentage at baseline to 78 percent at endline.

Strong foundations have now been laid to grow the GIFT tilapia sector – hatcheries are producing fingerlings, feeds are now being imported, farmers have been trained to raise tilapia and business models have been established to facilitate access to inputs and markets. However, the targeted number of beneficiaries, area of ponds and volume of tilapia production is low and it is unlikely the scale and impact targets will be met. Much of the scaling-up was expected through the adoption of GIFT tilapia production by indirect beneficiaries, however, there is no strategy to achieve this and it is not being monitored.

4.1.2 What factors are enhancing or constraining progress towards intended outcomes (e.g. management of risk, project management arrangements)?

Recruiting a suitably qualified and experienced national project manager has proved difficult, with international staff continuing to play a direct management role since the beginning of PADTL2. Nonetheless, many of the senior local PADTL2 staff also worked on PADTL1 and are now well experienced in tilapia production.

Previously, the biggest constraint that has affected implementation progress was COVID-19 which started in April 2020, when PADTL started and continued until October 2021, a period of 18 months when project implementation all but ceased. Since 2022, implementation has resumed and implementation progress has regained momentum.

The assumptions identified in the 'Risk Matrix' of the PADTL2 Proposal largely proved correct. However, the COVID-19 pandemic and its devastating effect on project implementation was not foreseen. Although Cyclone Seroja caused landslides, it did not directly damage any fish ponds. Recruiting a suitably qualified National Project Manager has not happened which puts more reliance on part-time international staff. Risks which continue to pose a threat to expected outcomes are increasing costs of imported feeds and MAF financing for the Gleno broodstock hatchery.



Currently, the lack of strategy to scale-up GIFT tilapia production is the biggest constraint towards achieving intended outcomes. The original theory of change envisaged more cooperation with other donor agencies and projects such as USAID, MDF, Mercy Corps, CARE, Caritas, CRS, TOMAK to increase the number of tilapia farmers. However, projects such as MDF and TOMAK, which also fund International Non-Government Organisations (INGOs), have discontinued their support for tilapia projects in favour of alternative strategies to improve nutrition.

4.2 Efficiency

Objective 2: to review the cost effectiveness of the approach employed to deliver results
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4.2.1 What could be done differently to improve implementation?

Implementation could have been improved through better monitoring and reporting to manage the project and also the delegation, or out-sourcing, of more activities to other development partners.

The project monitoring system failed to alert management regarding implementation progress towards higher level development objectives. The six-monthly PADTL2 Activity Progress Reports include good information regarding progress towards expected 'outputs' with detailed annexes, mainly focusing upon production efficiency parameters. However, there is little reporting against progress towards 'outcome' indicators or a detailed workplan for the next six months that shows a coherent strategy to achieve those outcomes. This has led to the project focusing on day-to-day activities and shying away from the big picture challenges, which are now evident.

Some of the indicators in the Results Measurement Table combine direct and indirect beneficiaries (e.g. hectares of ponds, tonnes of fish), which makes monitoring WorldFish achievements difficult. If the project is not directly responsible for achieving those target indicators, they should not be included in the Results Measurement Table. This mix of direct and indirect beneficiaries can be misleading as it signifies the project will achieve significant scale, not realising that third parties are expected to deliver that scale.

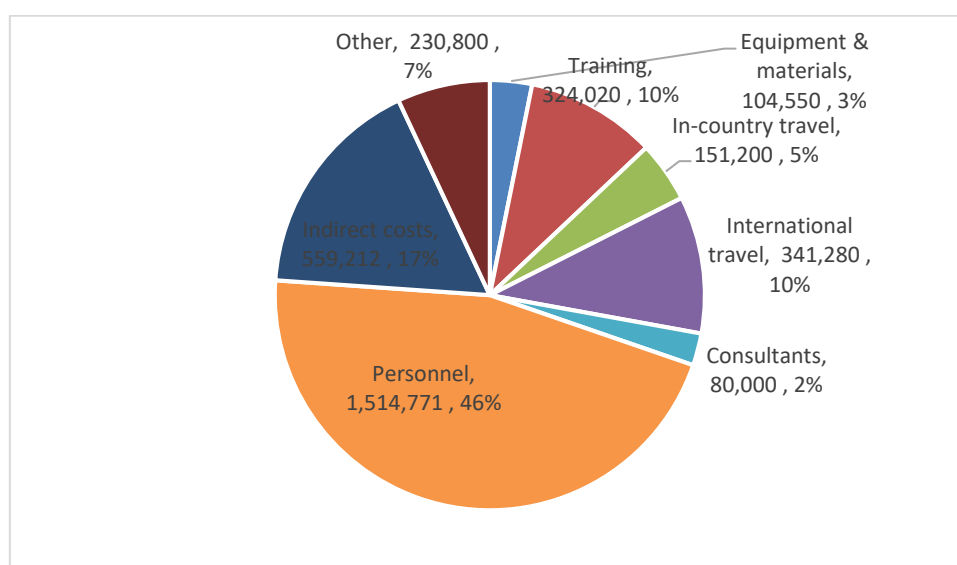
WorldFish is a leading aquaculture and fisheries research institution and this expertise proved essential in establishing the GIFT hatcheries and farmer clusters during PADTL1, which was largely carried out in-house. PADTL2's focus is upon commercialising the farmer clusters and scaling-up production, which relies more on extension, than research. WorldFish in Timor Leste does not have the implementation capacity to execute an extension project which could have been done through contracting INGOs using the PADTL2 cluster model and Best Management Practices (BMP) manuals.



4.2.2 Are resources being used in the best possible way in order to provide value for money?

Figure 1 shows the PADTL2 proposal budget (USD 3,304,059) broken down by cost type. Twenty percent was allocated for direct beneficiary inputs (equipment & materials, training and other) whilst 80 percent was allocated to personnel, consultants, travel and indirect costs. Although the proportion allocated to beneficiary inputs appears low, this is normal for capacity building projects, which require higher levels of personnel and consultants.

Figure 1: Budget by Cost Type (USD)



Source: PADTL2 Proposal

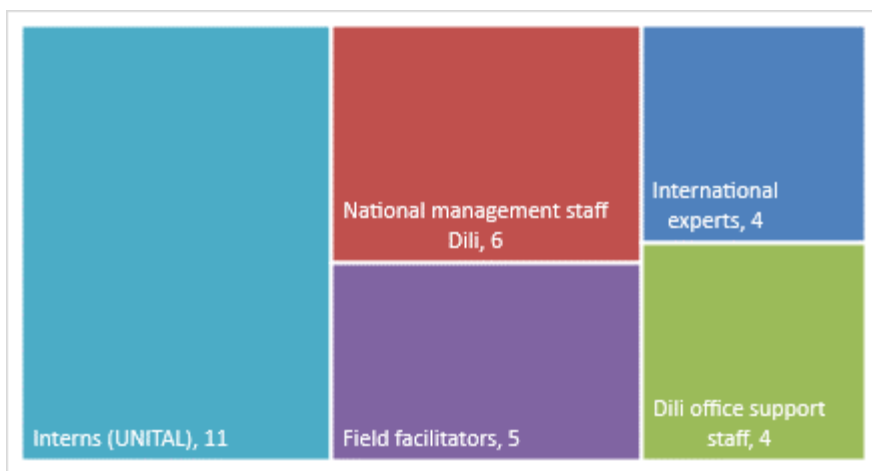
Figure 2 shows the PADTL2 has a total of 30 staff, 11 (37%) of whom are interns from the Universidade Oriental Timor Lorosa'e (UNITAL) studying fisheries degrees. The interns are located at the hatcheries to provide technical support to nursery owners but in return they also gain valuable practical experience working in an aquaculture hatchery.

There are 14 (47%) project management and support staff including four international experts, working from the Dili office. The international staff provide intermittent inputs for project management, documentation and the nutrition and hatchery experts provide technical support to their respective national counterparts. There is no National PADTL2 Project Manager position.

Recently, five Field Facilitators have been recruited to provide technical support to the farmer clusters and collect performance data from farmer ponds.



Figure 2: PADTL2 Staffing Numbers



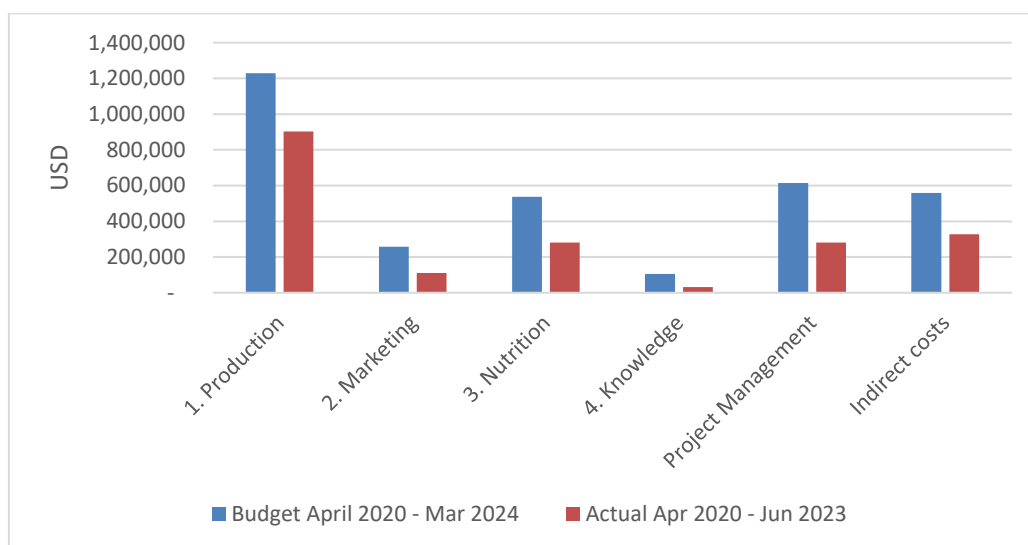
Source: PADTL2 records

Prior to the recruitment of the interns and Field Facilitators, there were very few field-based staff, which are necessary to carry out extension work.

Figure 3 shows project expenditure against budget by component. The budget is for the period April 2020 to March 2024, whereas expenditure covers the period April 2020 to June 2023. Overall, expenditure is just 59 percent (USD 1,933,202) of budget, with the highest proportion in terms of percent of allocated budget spent (74%) and absolute value (USD 903,518) being the production component.

Project management and indirect costs accounted for 36 percent of budget and has accounted for 31 percent of expenditure (USD 608,090), although only 52 percent of the budget has been spent. This indicates project management and indirect cost expenditure is proportionally commensurate with the original budget.

Figure 3: Project Expenditure Against Budget by Component

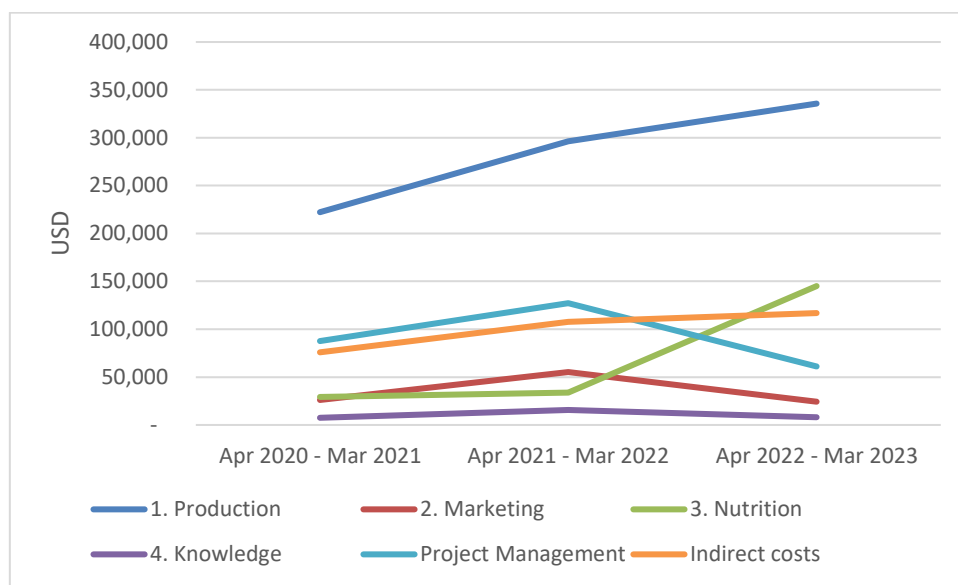


Source: WorldFish Statement of Funds Status (19th July 2023)



Figure 4 shows expenditure by component and year. Overall expenditure has increased from USD 448,609 in 2020/2021 to USD 635,843 in 2021/2022 to 690,919 in 2022/2023.

Figure 4: Expenditure by Component and Year



Source: WorldFish Statement of Funds Status (19th July 2023)

According to the Statement of Funds Status (WorldFish, 19th July 2023) the total expenditure for PADTL2 between 16th April 2020 and 30th June 2023 was USD 1,933,202. Based upon the total number of 339 direct beneficiaries, this is USD 5,703 expenditure per direct beneficiary. Other indicators are USD 236,622 expenditure per hectare of fish pond (8.17ha) and USD 33.61/kg of fish produced (57,513kg).

Whilst the investment per direct beneficiary and per kilogramme of fish produced do not appear excessive, especially as the beneficiaries will continue to produce more fish, the expenditure per hectare of fish pond is high. This is due to the small size of fish ponds in Timor Leste, with the average pond being only 143m². It must also be noted the above calculations do not include the investment (sunk costs) made under PADTL1, which trained 250 direct beneficiaries on 3.9ha of ponds that are included in PADTL2.

4.2.3 Factoring in the impacts of COVID-19 delays and floods in 2021, can costs be reduced in the remaining two years as originally planned?

The original budget of USD 3,304,059 was to be spent over a three year period between April 2020 and March 2023. By March 2023 only USD 1,775,371 had been spent, leaving a balance of USD 1,528,688. A No Cost Extension (NCE) was granted until March 2024. The remaining budget on 30th June 2023 was USD 1,370,857. Based upon the highest annual spend of USD 690,919 in 2022/2023, it is unlikely the remaining budget will be spent before the end of the NCE and the remaining



balance would be enough to finance another year of implementation after the current NCE period expires.

The important question is, what should the remaining USD 1.37 million be spent on? Based upon the cost indicators in Section 4.2.2, the remaining budget would finance an additional 268 fish farmers, 6.5 ha of fish ponds and 45,483 kg of fish production.

The second most important question is whether WorldFish has the capacity to reach an additional 268 farmers, for example, if to date it has taken at least six years to train 339 farmers.

4.3 Sustainability

Objective 3: to identify the key changes needed, if any, to deliver sustainable outcomes from the Aquaculture Development in Timor-Leste

4.3.1 To what extent is local ownership of the Activity developing?

The MAF GIFT broodstock hatchery at Gleno is under financed. As income cannot be accrued from the sale of fingerlings, the hatchery is dependent on MAF financing which can be insufficient. To ensure ongoing operations, PADTL2 continues to provide financial support to the hatchery, which is unsustainable. This poses a significant risk to the sustainability of GIFT tilapia production in Timor Leste, as it is central to the supply chain.

MAF also supports other mixed-sex tilapia hatcheries in Timor Leste, which not only limits the budget available for Gleno hatchery but is also inconsistent with the strategy for promoting the use of GIFT tilapia. The recently published Government Programme for 2023-2028 (RDTL, 2023) did not mention tilapia or GIFT.

The other vital elements in the business model (feed imports, PPP hatcheries, fish marketing) are carried out by private sector and should be sustained if profitable and all indications are that the business model is viable if the sector continues to grow (See Section 4.5.2).

4.3.2 To what extent are the activity interventions likely to be sustained after MFAT's funding has concluded? What actions could be taken to improve sustainability?

Subsidised fingerlings and feeds were provided to LSPs and famers to recover after COVID-19. Based upon interviews carried out as part of this evaluation, subsidised feeds and fingerlings were still in the supply chain. To ensure the business model becomes viable in real terms, subsidies must be stopped.

MAF financial capacity for implementing projects is limited. TOMAK and MDF have discontinued support to tilapia projects and USAID have yet to decide their future programming activities. It is likely there will be very little funding for tilapia after MFAT funding has concluded. It is therefore a priority investments to date are made sustainable through an Exit Strategy that ensures the cluster business models remain viable under private sector governance.



Activities under the nutrition component were mostly short-term, one-off events. Communities received only one days training and there is no plan for this to be repeated or carried out with additional communities. There is very little information on the establishment of Village Savings and Loan Associations (VSLA) carried out as part of PADTL2 and it is unlikely the VSLAs are strong enough to be sustained after such a short period of support.

4.3.3 What could be done to mitigate the impact of changing in-country staff at the Ministry of Agriculture and Fisheries?

Even though the Director General of Fisheries has remained constant during PADTL2, the National Director of Aquaculture has changed twice. Some Municipal Fisheries Officers previously trained under PADTL1 have also changed. However, this has not had a negative effect upon project implementation, as PADTL2 has a private-sector based approach.

Although the role of Government is usually central to strategies for sustainability, the limited financial capacity of MAF to provide field level support to projects must be recognised and projects planned accordingly, so as not to rely on MAF to implement field activities. This is a major consideration when preparing an Exit Strategy for PADTL2.

4.3.4 If an exit strategy is in place, assess its appropriateness and recommend amendments if necessary. If not, recommend a suitable strategy.

PADTL2 does not have an Exit Strategy, or a workplan and budget for the remaining duration of the project.

A suitable Exit Strategy must focus upon ensuring the private sector cluster business models continue to be viable and replicable without the use of subsidies. This includes the supply of fingerlings and feeds and access to market. Profitability of each cluster function is analysed in Section 4.5.2. Technical support for farmers must also be considered and is most likely to come from 'Master' fish farmers in each cluster, which needs to be developed.

Considering the lack of interest in GIFT tilapia farming from other donors, replicating the private sector cluster business model will need to be driven by private sector entrepreneurs. This could be initiated through fish traders providing feed, seed and training to farmers under a 'buy-back' agreement. The fish traders may be eligible for an agriculture or business loan from Banco Nacional de Comércio Timor-Leste to establish the cluster business model.



4.4 Adaptive Management

Objective 4: to examine the progress being made in achieving outputs and short and medium term outcomes during the pandemic

The start of COVID restrictions coincided with the start date of PADTL2 in April 2020.

4.4.1 What impact did COVID-19 have on progress in achieving intended outputs and outcomes?

COVID affected project implementation between April 2020 and October 2021, a period of 18 months during which the whole country was often in lock-down. Based on the original work plan included in the PADTL2 Proposal, the implementation of key planned activities such as a baseline nutrition survey and enrolling new farmer clusters was delayed by up to 18 months, commensurate with the COVID affected period.

Nevertheless, PADTL2 has managed to recover since the end of COVID restrictions and some of the planned targets for direct beneficiaries (number of hatcheries and farmer clusters) will be met during the No Cost Extension period (April 2023 – March 2024).

4.4.2 What were the challenges faced due to the Covid 19 lockdown and the project attempts to sustain the outcomes it achieved before Covid 19?

COVID related travel restrictions prevented the arrival of international consultants in to Timor Leste and also movement of national project staff within the country. Fish feeds could no longer be imported and the price of fish feeds already in the country rose. Fingerlings could not be distributed from the hatchery at Gleno and there was a risk the broodstock would be lost. Due to the lack of fingerlings and feeds, six of the eight cluster based fingerling nurseries stopped working. Travel restrictions also prevented fish sales to Dili.

4.4.3 What changes were made to adapt to the pandemic?

The survival of the whole GIFT tilapia supply chain was reliant on the maintaining the GIFT hatchery at Gleno during the pandemic. The decision to only produce broodstock, rather than grow-out fingerlings, meant there were less fish to maintain and PADTL2 provided additional support ensuring the hatchery survived. MFAT also agreed to provide a cycle of subsidised fingerlings and feeds to farmers in 2021.

The advantage of tilapia production is that semi-commercial production can be reduced to subsistence based production in times of difficulty. The reduction in feeds was mitigated through the use of green water feeding and the decrease in overall production meant the fish could continue to be sold within the local community and did not need to be transported to distant markets.



4.4.4 Which changes were effective and which weren't?

The Gleno and PPP hatcheries have recovered since the end of COVID, largely due to support provided by PADTL2 during the pandemic.

It is difficult to assess the effectiveness of providing subsidised fingerlings and feeds as a response to COVID and estimate how many fish farmers would have stopped production if they had not received the subsidised inputs.

Due to domestic travel restrictions in Timor Leste, it is unlikely the use of less international consultants in favour of Timor-based consultants, would have mitigated the effects of COVID. However, some of the desk-based work such as the preparation of Best Management Practices (BMP) and nutrition products, could have been carried out remotely. The BMP manuals are still at draft stage and Mercy Corp nutrition work did not start until July 2022.

4.5 Impact

Objective 5: to assess the likelihood of achieving the long-term outcomes of sustainable economic and nutritional benefits for rural households.

4.5.1 Is GIFT tilapia the best source of protein for poor households?

The Activity Progress Reports for April 2022 to March 2023 state 3,524kg of tilapia was consumed by the households that produced the tilapia, which is the equivalent to eleven percent of total production (32,419 kg). Based upon 171 households raising tilapia, this equates to 21kg tilapia consumed by each household over the twelve month period. If the average household has 5.4 persons (INETL, 2023), average tilapia consumption by tilapia farming households is 3.89 kg/capita per year. This remains far below the National Aquaculture Development Strategy per capita fish consumption target of 15 kg/capita per year.

Tilapia consumer prices vary between USD 4.00/kg in Lautem to USD 7.00/kg in Dili, which is higher than the alternative animal protein source of imported broiler chicken at USD 3.50/kg. The high price raises a concern that tilapia is an unaffordable source of protein for poor households, which are more likely to suffer from poor nutrition.

Although tilapia production can be highly profitable, it is capital intensive, with high costs of production and initial investment costs (Ref: Table 7), which also raises the concern GIFT tilapia production is unaffordable for poorer farmers who are more likely to suffer from poor nutrition.

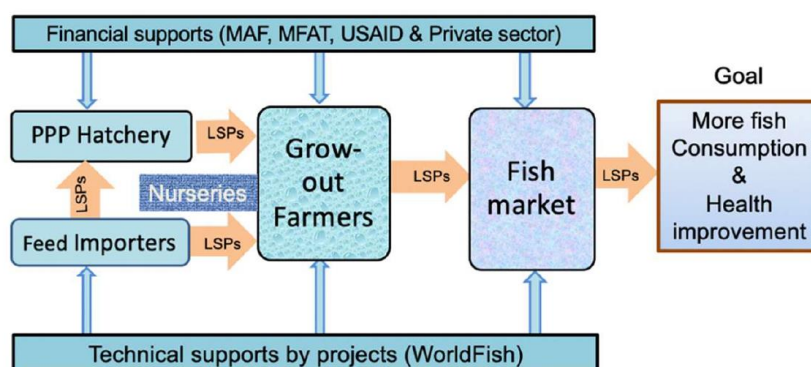
There is no doubt tilapia is a good source of protein but until prices reduce and it becomes more available on the open market, it is unlikely to have a significant impact upon improving nutrition. Based upon fish farmer interviews carried out as part of this evaluation, producers' primary purpose for raising tilapia is as a cash crop, although a small proportion is consumed in the home.



4.5.2 Is the business model for aquaculture commercially viable?

Figure 5 shows the PADTL2 cluster business model. The MAF hatchery at Gleno (not shown in the diagram) supplies the PPP hatcheries with broodstock, which then sell fingerlings to cluster nurseries and grow-out farmers. Feed Importers supply feed to the Grow-out Farmers, who then sell fish to the Fish market. The Fish market then sells fish to the goal of More fish Consumption & Health improvement. Financial supports (MAF, MFAT, USAID & Private sector) and Technical supports by projects (WorldFish) provide external support to the PPP Hatchery, Nurseries, Grow-out Farmers, and Fish market.

Figure 5: PADTL2 Cluster Business Model



During PADTL2 the clusters have been strengthened through the introduction of Public Private Partnership (PPP) hatcheries and local nurseries to supply fingerlings, Local Service Providers (LSP) to supply pelleted feed and buy fish from farmers for sale in local markets or to transport to more distant markets for sale. This model ensures all essential value chain linkages and contributes significantly to sustainability. Table 5 shows which services are available to each of the clusters.

Table 5: Availability of LSP Services by Cluster.

Municipality	Cluster	No. Households	PPP hatchery	Nursery Operator	Feed supplier	Fish buyer
Baucau	Gariuai	15		1	1	1
Baucau	Goa7	31		1	1	1
Baucau	Ossoguigui	15		1		
Bobonaro	Balibo	34		1	1	2
Bobonaro	Batugede	38		1		1
Bobonaro	Leohito	69	1			1
Ermera	Fatuquero	10	Gleno		1	1
Ermera	Laubono	28		1	1	1
Ermera	Poetete	14				
Lautem	Parlamento	30	1	1	1	1
Lautem	Los Palos	20				
Dili	Hera	10	1			
Manufahi	Colocau	25	1			

Source: Project records

Note: Los Palos, Hera and Colocau clusters are new and LSPs are currently being established.

Some clusters have stronger models than others. For example, the Leohito cluster has all elements – PPP hatchery, feed supplier and fish buyer. Some LSPs are multi-functional. For example, the fish buyer in Leohito sells fish in Dili, so can purchase fish feed there and transport it back to Leohito, reducing transport costs. Some



LSPs are also GIFT tilapia out-growers, which reduces risk by evening out fluctuating demand for fingerlings, feed or finished fish.

Weaker clusters include those in Baucau municipality due to the absence of a PPP hatchery. The fingerling nurseries in Goa7 and Gariuai also do not have access to a fresh water supply, so have to purchase water from tankers for USD 25 to fill their ponds. Otherwise, the Baucau clusters benefit from a close proximity to Baucau town which has the second highest urban population in Timor Leste (19,118 persons³).

The sustainability of the private sector based model relies upon profitability. Table 6 shows the net profit for fingerling nurseries (10,000 fingerlings), feed suppliers (20 sacks) and fish traders (100kg).

Table 6: LSP Profitability

	Fingerlings	Feed	Finished Fish Sales
Income	9,000 fingerlings @ \$0.05 each = \$450 ¹	20 sacks (600kg) @ \$1.75/kg = \$1,050 ²	100kg fish @ \$5/kg = \$500
Purchase price	10,000 fingerlings @ \$0.03 each = \$300 Feeds = \$15	20 sacks @ \$42/sack = \$840	100kg fish @ \$4/kg = \$400
Transport cost	Fuel Baucau to Dili = \$20	20 sacks @ \$2/sack ³ = \$40	Fuel Bobonaro to Dili = \$20
Net Profit	\$115	\$170	\$80
RoI	34%	19%	19%

Source: LSP interviews

¹ 90% survival rate

² LSP sells feed by the kilogramme, not by the sack

³ Transport Dili to Parlamento, Lautem by bus

Based on the analysis in Table 6, all LSPs are profitable and profit is simply based upon 'marking-up' stock costs. Based upon Cluster Master Data a gross margin for tilapia production is provided in Table 7, which shows profit per hectare and for an average sized pond.

³ INETL Timor Leste Population & Housing Census 2022



Table 7: Production Gross Margin

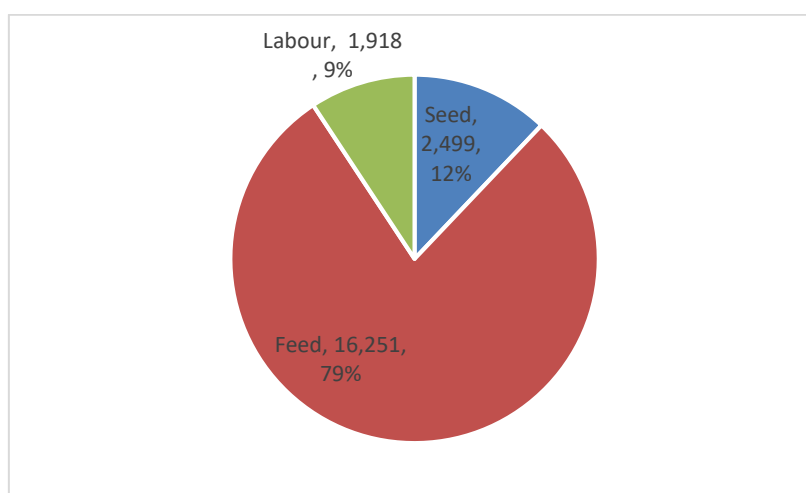
Items	USD/ha	USD per 143m ² pond
<u>Income</u> 12,400kg fish @ \$4/kg	49,600	709
<u>Expenditure</u>		
Seed	2,449	36
Feed	16,251	232
Labour	1,918	27
Sub-total expenditure	20,667	296
Profit	28,933	413

Source: Tilapia – PADTL2 Master Cluster data

Based upon the above financial analysis, tilapia production provides a Return on Investment of 57 percent. Return on labour for a one hectare pond is estimated at USD 1,286/day based on working one hour/day for six months.⁴

Interestingly, the break-even price of tilapia is USD 1.67/kg, considerably less than the farm-gate price of USD 4.00/kg. Figure 6 provides a breakdown of costs for tilapia production.

Figure 6: Production Cost Breakdown (USD/ha)



Source: PADTL Cluster Master Data

Seventy-nine percent of costs are for feed. If imported feed costs and producer profit margins could be reduced, tilapia may become a more affordable form of protein.

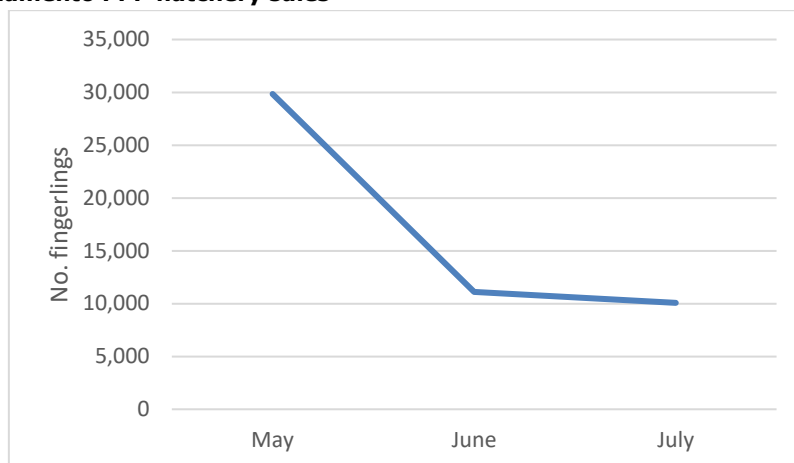
Whereas the profitability of LSPs is dependent on turning over stock (operating costs), the hatcheries' profitability is dependent on covering overhead costs such as

⁴ 180 days x 1 hour / 8 hours = 22.5 FTE days



staff wages, feeds, utilities etc. The Value Chain Report carried out in 2022 estimated it cost USD 2,500/month to operate the Gleno hatchery and USD 800/month to operate a PPP hatchery, the equivalent of nearly 27,000 fingerlings/month at a sales price of USD 0.03 each. Figure 7 shows the number of fingerlings sold by the PPP hatchery in Parlamento between May and July 2023.

Figure 7: Parlamento PPP hatchery sales



Source: Parlamento hatchery records

Only SRT production is recorded in the Project Activity Reports, not actual fingerling sales. Although fingerling sales will differ month on month, the average monthly sales for the three months is 17,000 fingerlings. This data is also difficult to reconcile with SRT production records in the Activity Progress Reports, which are multiples of the sales figures.

The farmer cluster approach adopted under PADTL2 has proved effective for aggregating small-scale fish farmers to access inputs, technical support and markets. However, the viability of the hatcheries poses a significant risk to the sustainability of the business model. Also, as production increases, proximity to market will become more important as the local community market becomes satiated. This therefore raises questions regarding the viability of the new cluster in Manufahi.

4.5 Gender and Youth Inclusivity

A Gender Equality and Social Inclusion (GESI) Analysis Report was prepared by PADTL2 in 2021 and recommended women and youth were supported to participate in tilapia production and marketing. Linkages with microfinance institutions and informal education was also recommended. However, a strategy was never developed to achieve that.

Tilapia farming is suitable for women as the ponds are usually located close to home and it is not time consuming or physically demanding. Based upon latest cluster data, women account for 25 percent (84 women) of PADTL2 fish farmers. Over half of the women (47 women) were located in Batugede and Leohito clusters in Bobonaro municipality.



The Timor Leste National Youth Policy (2007) considers youth to be aged between 16 and 30 years old. PADTL2 considers a slightly higher age limit of 35 years to be a youth. Based upon this definition, 46 of the 339 beneficiaries (14%) can be considered youth. Youth in Timor Leste are losing interest in the agriculture sector, primarily due to drudgery, low profitability and low returns on labour compared to working in Dili or overseas. Although the return on labour for tilapia production is extremely high at USD 1,286/day per hectare (or USD 18.39/day for an average sized pond), youth participation is low, possibly due to lack of start-up investment capital.



5. Evaluation Conclusions

1. Project implementation progress has been delayed due to COVID and even with a NCE, it is unlikely most output and outcome indicators will be met.

COVID-19 delayed implementation by about 18 months. Although PADTL2 is recovering pace, it is not expected the planned results and outcomes will be achieved regarding number of beneficiaries, area of ponds farmed and volume of fish produced. Although 'quantitative' indicators regarding scale have not been achieved, 'qualitative' indicators regarding productivity, such as yield, are very positive.

Apart from the negative effects of COVID-19 upon project implementation, the scaling up of project activities to include indirect beneficiaries has been hampered by donor partners discontinuing their support to tilapia projects.

Financial analysis of tilapia production has shown that it is a good income generating activity, producing a profit of USD 413 per cycle for an average sized pond and income objectives are likely to be achieved for beneficiary households. However, tilapia production for improved nutrition has not been effective with poor or even negative MDD scores. Also the indicator used to monitor changes in nutrition is not tilapia consumption but the diversity of food groups consumed, which is beyond the project's main focus.

2. The project monitoring and reporting system focuses upon activities and outputs with not enough attention on outcomes.

The project monitoring system has failed to alert management regarding implementation progress towards higher level development objectives. The six-monthly Activity Progress Reports includes information on 'activities' and 'outputs' with not enough attention paid to 'outcomes'. Even though indicators of impact are far below target, remedial action has not been taken to mitigate under performance.

Some of the indicators in the Results Measurement Table combine direct and indirect beneficiaries (e.g. hectares of ponds, tonnes of fish), which makes monitoring WorldFish achievements difficult. This mix of direct and indirect beneficiaries can be misleading as it signifies the project will achieve significant scale, not realising that third parties are expected to deliver that scale.

3. Cost effectiveness is mixed

According to the Statement of Funds Status 59 percent (USD 1,933,202) of the original budget (USD 3,304,059) had been spent by 30th June 2023, which is commensurate with the 18 months of COVID related restrictions. Due to the delays, a no cost extension was granted until March 2024. Expenditure has increased to USD 690,919 in the 2022/2023 financial year, however, it is unlikely the remaining budget will be spent before the end of the NCE.

Based upon spending to date; expenditure per direct beneficiary is USD 5,703 (339 beneficiaries), expenditure per hectare of fish pond is USD 236,622 (8.17ha) and expenditure per kilogramme of fish is USD 33.61/kg (57,513kg).



Whilst the investment per direct beneficiary and per kilogramme of fish produced are not excessive, especially as the beneficiaries will continue to produce more fish, the expenditure per hectare of fish pond is high. This is due to the small size of fish ponds in Timor Leste, with the average pond being only 143m². The above calculations do not include the investment (sunk costs) made under PADTL1, which trained 250 direct beneficiaries on 3.9ha of ponds that are included in PADTL2.

4. Tilapia production is commercially viable.

GIFT tilapia production is commercially viable, even with high feed costs, if the farm-gate price remains above USD 1.67/kg (break-even price).

The cluster business model approach ensures sustainability by providing independent private sector linkages to inputs and markets. However, as production increases, proximity to market will become increasingly important. Whilst the clusters in Dili, Baucau, Bobonaro, Ermera and Lautem are well placed with large urban populations and/or close proximity to Dili; the new cluster and PPP hatchery in Colocau (Manufahi) is less suitable due to a small urban population in Same and long distance to Dili. This is exacerbated by the very poor condition of the road network in the area.

5. Tilapia is not an affordable source of nutrition for poor households

Although fish farming households have increased tilapia consumption to 3.89 kg/capita per year, it is still far below the NADS fish consumption target of 15 kg/capita per year.

Farming GIFT tilapia requires comparatively high investment (ponds) and operating costs (feed), which is above the capacity of most poor farming households and the retail price of GIFT tilapia is also beyond the reach of most poor households.

6. The nutrition strategy is flawed

The nutrition intervention was short-term and involved a series of one-off events, without any plans for sustaining or replicating the interventions. Support was also provided for establishing Village Savings and Loans Groups, without any plans for sustaining the groups. Improving nutrition and access to credit requires a significantly more comprehensive approach to achieve any sustainable impact than what was provided under PADTL2.

Increased consumption of tilapia by poor households to improve nutrition will only take place once production and consumer prices are reduced and tilapia is more widely available on the open market. This will only occur through significant scaling up of production.

7. Tilapia production can be inclusive for women and youth.

Tilapia farming is suitable for women as the ponds are usually located close to home and it is not time consuming or physically demanding. PADTL2 achieved a respectable 25 percent participation by women.

Youth in Timor Leste are losing interest in the agriculture sector, primarily due to drudgery, low profitability and low returns on labour compared to labouring work in Dili or overseas. Although the return on labour for tilapia production is extremely



high at USD 1,286/day, youth participation is low, possibly due to lack of start-up investment capital.

8. Sustainability is at risk.

The cluster business model is private-sector based and should be sustained if profitable and all indications are that the business model is viable with continued growth. However, the model is anchored to the MAF GIFT broodstock hatchery at Gleno, which is under financed and remains dependant on PADTL2 for financial support. Furthermore, the PPP hatcheries are dependent on a minimum number of monthly fingerling sales to cover overhead costs to remain viable and current records indicate that for some months sales are below the minimum amount.

The project design envisaged widespread adoption and scaling up of PADTL2 activities by indirect beneficiaries and other donor partners, which have now lost interest in tilapia. It is likely there will be very little funding for tilapia after MFAT funding has concluded.

PADTL2 has no Exit Strategy or a detailed workplan and budget for the remainder of the project, so considering all of the above factors, there are considerable threats to sustainability.



6. Lessons Learned

The following lessons learned highlight what has worked well for PADTL2 and should continue in to the next scaling-up phase and applied to other new tilapia projects in Timor Leste.

In Timor Leste, tilapia production is primarily an income generating activity.

GIFT tilapia production is effective for generating income, if raised on a commercial basis with links to feed, seed and market. Although tilapia production can contribute towards improved nutrition, it is currently too expensive to be produced by, or purchased by, poor households. If improving nutrition is the primary development objective, there are better alternatives than tilapia production.

Clustering of smallholders provides essential linkages.

The cluster approach has proved very effective in aggregating smallholders to produce fish on a commercial basis and could be used for commercialising other crop production in Timor Leste.

Use pelleted feeds.

Importing pelleted feed has been a game-changer, allowing the commercialisation of tilapia farming. With the exception of green-water feeding, training farmers to produce their own on-farm feed was a waste of time and possibly delayed the commercial uptake of tilapia farming.

Importance of market linkages for growth

As experienced in the Leohito cluster, once production increases beyond local consumption, finding markets is a priority. Cluster development needs to start at where consumption is (urban areas) and work backwards from there, rather than establishing clusters in isolated locations and then seeking markets.



7. Recommendations

The list of recommendations are prioritised and directed at specific stakeholders to take key next steps.

1. Prepare a workplan and budget for the remaining years of project implementation

A detailed workplan and budget is prepared by WorldFish with MFAT approval for the remaining years of project implementation. The workplan and budget is broken down in to six monthly actions to facilitate monitoring.

Based upon the maximum spending capacity to date of USD 700,000/year, the remaining balance from June 2023 would be enough to finance the project until June 2025, without the need for any additional funding.

The constraints to 'scaling-up' are the extension capacity to reach new fish farmers, the availability of suitable sites for fish ponds and the interest of LSPs to establish the necessary cluster business models. A feasibility analysis must be carried out by WorldFish to ensure these constraints can be overcome and that the number of target beneficiaries is increased from 339 households to at least 500 households by project closure. Based upon the historical investment costs per farmer provided in Section 4.2.2, the remaining balance is enough to support an additional 268 farmers and there is no need for additional financing.

2. Revise performance indicator targets and include 'progress towards outcomes' in reporting

The target number of direct beneficiaries (500 households) is achievable with scaling-up. However, due to the small size of individual ponds, the target area of ponds and volume of fish produced will not be achieved. WorldFish revises the performance indicators in the Results Measurement Table to reflect the workplan. Indicators relating to indirect beneficiaries are clearly segregated from direct beneficiaries. The nutrition indicator (MDD) is revised to 'increased tilapia consumption'.

MFAT revises the six monthly progress report format to better link reporting to the workplan and budget and include reporting on progress toward outcomes.

3. Include an Exit Strategy in the Workplan to ensure sustainability

An Exit Strategy is included in the workplan to ensure sustainability and accounts for limited support from MAF or donor partners. Technical support for farmers must be considered and is most likely to come from 'Master' fish farmers in each cluster, which needs to be developed. Replicating the private sector cluster business model will need to be driven by private sector entrepreneurs. This could be initiated through fish traders providing feed, seed and training to farmers under a 'buy-back' agreement, or other such models. The fish traders may be eligible for an agriculture or business loan from Banco Nacional de Comércio Timor-Leste to establish the cluster business model.



Further lobbying is carried out by MFAT/WorldFish to ensure MAF funding for the GIFT broodstock hatchery at Gleno. As the Gleno hatchery is the anchor point for sustainability, a guaranteed budget from MAF to continue funding the operating costs of the hatchery is a pre-condition for continued MFAT financing of PADTL2.

The clusters are encouraged to become independently viable as soon as possible. Once farmers and LSPs are connected to markets (i.e. have income to reinvest in their business), no further subsidies are provided by PADTL2.

4. Focus upon scaling-up

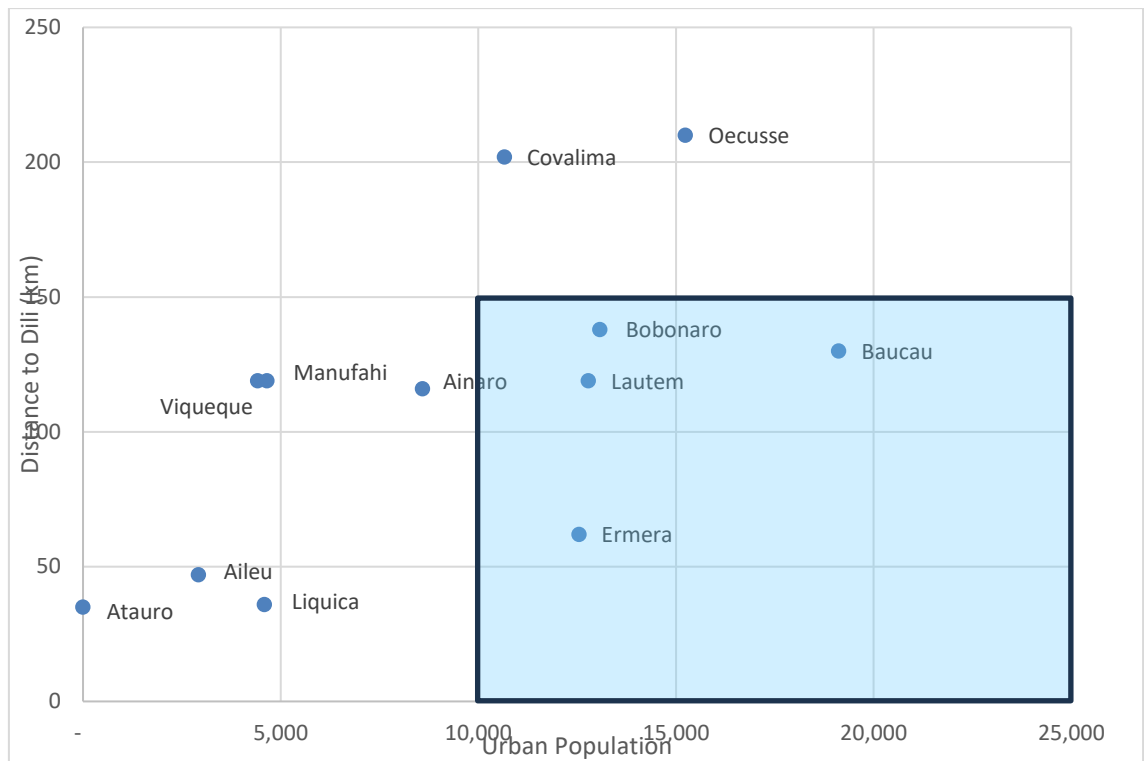
Any new phase of the project focuses upon scaling-up activities to include more beneficiaries and increased tilapia production. WorldFish seeks partnerships / sub-contracts with INGOs to implement the expansion, based on the cluster business model and BMP extension materials developed by PADTL. The previous Combating Malnutrition and Poverty through Aquaculture in Timor Leste (COMPAC-TL) project implemented by WorldFish in collaboration with Mercy Corps and Hivos and local NGOs Prospek and Fraterna between 2014 and 2016 provides a template for such partnerships.

Existing clusters are encouraged to increase membership and new clusters are established in Dili, Bobonaro, Lautem, Ermera, Manufahi, Viqueque and Baucau municipalities by PADTL2. As production increases, proximity to market will become increasingly important and these municipalities have higher urban populations and are closer to Dili.

Figure 8 shows a scatter graph of municipalities (with the exception of Dili) based upon two criteria – the urban population of the municipality (INETL, 2022) and distance from Dili (DGS, 2019). The analysis assumes the urban population are net consumers of food and are more likely to purchase tilapia than the rural population who are net producers of food. Therefore, the higher the urban population, the higher potential demand for tilapia.



Figure 8: Ideal Cluster Locations



The blue shaded area identifies the four municipalities, in addition to Dili, with the highest potential demand for tilapia as they have urban populations over 10,000 persons and are within 150 km of Dili (the highest population centre).

A pre-condition for any additional funding is agreement on the number of new clusters to be established in Dili, Baucau, Ermera, Lautem and Bobonaro municipalities with the supporting feasibility analysis, as mentioned above.

5. Strengthen exiting clusters

PADTL2 carries out a business audit of the PPP hatcheries to assess financial viability and sustainability. Further support for institutional strengthening is provided, as required.

As Baucau has a high potential demand for tilapia, a new PPP hatchery is established there to strengthen the existing cluster model by PADTL2 or another development partner.

The use of Interns and Field Facilitators by PADTL2 is continued to provide the important field presence.

In addition to supplying tilapia to supermarkets, a marketing strategy is developed by PADTL2 to target the traditional wet market segment.



6. Develop strategy to improve inclusivity

Although tilapia production is suitable for women and youth and a GESI report was prepared, a strategy was never implemented to improve inclusivity. As recommended in the GESI report, links between women and youth and microfinance and informal education providers are established to improve inclusivity.

7. If nutrition is the priority objective, MFAT seeks a better strategic approach

Due to the high costs of production of GIFT tilapia in Timor Leste and the methodology used to measure nutrition levels, tilapia production alone is not an effective means of improving nutrition. If improving nutrition for poor households is the primary objective of MFAT investment, rather than increasing incomes, a more nutrition-focused approach is needed. This is likely to include the low cost production of diverse nutritious foods in home gardens and improved knowledge and practices on nutrition, rather than a sector commodity driven approach.



Appendices

APPENDIX A: Documents Reviewed

Bonis-Profumo et al (2022) <i>Aquaculture – Nutrition Baseline Survey</i> , WorldFish
Bonis-Profumo (2023) <i>Nutrition Component Report PADTL2</i> , WorldFish
INETL (2023) <i>Timor Leste Population and Housing Census 2022</i>
Klumpyan (2023) <i>PADTL2 Nutrition Endline Survey</i> , Mercy Corps
PADTL2 (Dec 2020) <i>Activity Progress Report: April 2020 – September 2020</i> , WorldFish
PADTL2 (May 2021) <i>Activity Progress Report: October 2020 – March 2021</i> , WorldFish
PADTL2 (Nov 2021) <i>Activity Progress Report: April 2021 – September 2021</i> , WorldFish
PADTL2 (May 2022) <i>Activity Progress Report: October 2021 – March 2022</i> , WorldFish
PADTL2 (Nov 2022) <i>Activity Progress Report: April 2022 – September 2022</i> , WorldFish
PADTL2 (May 2023) <i>Activity Progress Report: October 2022 – March 2023</i> , WorldFish
RDTL (2023) <i>Programa IX Governu Konstitusional 2023-2028</i> , Timor Leste
WorldFish (2020) <i>PADTL2: A proposal by WorldFish to the Ministry of Foreign Affairs & Trade, New Zealand.</i>



APPENDIX B: Results Measurement Table

From agreed Results Measurement Table in the Activity Design Document			Data up to and including this reporting period (April 1 – September 30 2022)		Planned target (April 2023 – March 2024)
Planned Indicators	Planned Target	Planned methodology and data source	Actual measurement against targets and data sources	Variance explanation	
Output 1: Smallholder aquaculture production strengthened to SME level through improved access to high quality inputs (feed, seed) and technology through research, and services (extension and finance), with private sector involvement					
1.1 Improved access to quality seed					
Number of PPP GIFT hatcheries in the aquaculture industry	1 government & 2 more PPP GIFT hatcheries established during PADTL Phase 2 to continue operations with expanded capacity; 2-3 new PPP GIFT hatcheries will be established	Hatchery monitoring database established within project (Established)	<p>a) 1 government hatchery (Gleno) continues operation with relatively low production.</p> <p>b) The 1st PPP hatchery (Leohitu) is continuously producing monosex fry since its establishment in 2019.</p> <p>c) The 2nd PPP hatchery (Parlamento) is performing well since its establishment in 2020.</p> <p>d) Development of the 3rd & 4th PPP hatcheries in Colocau</p>	<p>a) 1 government hatchery (Gleno) continuing producing monosex seed and GIFT broodstock supply to PPP Hatcheries. However, overall performance of the hatchery needs improvement</p> <p>b) Despite increased number of broods since early 2022, production/productivity of seed remained relatively low</p> <p>c) Parlamento hatchery continue performing well</p> <p>d) The two PPP hatcheries (Hera & Colucau) started their operation in early 2023. They</p>	<p>a) Continue technical backstopping (staff training, mentoring & quality management) with the emphasis improving performance and ensuring sustainability.</p> <p>b) As mentioned above (a)</p> <p>c) Support Parlamento hatchery to increase seed production, productivity and quality</p> <p>d) System set-up, equipment / material support, staff training/mentoring, quality monitoring and marketing of monosex seed.</p>

From agreed Results Measurement Table in the Activity Design Document			Data up to and including this reporting period (April 1 – September 30 2022)		Planned target (April 2023 – March 2024)
Planned Indicators	Planned Target	Planned methodology and data source	Actual measurement against targets and data sources	Variance explanation	
			<p>(MAFT) and Hera (USAID) respectively have been successfully established and are in progress. Hera was inaugurated on 17th March 2023 and Colocau is to in June-July.</p> <p>e) MAF requested to provide assistance for a hatchery at Fatuberleu, Manufahi to serve as backup for Gleno hatchery to maintain genetic quality of the broodstock.</p>	<p>were provided with all technical supports and considerable mount of financial supports (technical & financial) to start and run successfully.</p> <p>e) Government has invested to develop basic facility. Recommendations were provided. Supports of all the materials, equipment and technical back up have been promised to provide soon.</p>	e) System set-up, equipment / material support, staff training/mentoring, and quality monitoring
Number of private GIFT nurseries	2-4 private GIFT nurseries linked to each PPP hatchery	Project monitoring records	a) 7 private nursery operators established by WorldFish have been linked to Gleno and 2 PPP hatcheries, and are continuing operation;	Target of nurseries yet to be met. However, 5 private nursery operators are in operation which are supported by other I/NGOs with technical assistance from WorldFish, have been linked to Leohitu (2) and Parlamento (3) hatcheries. More the nurseries better would be seed	a) 8 additional nurseries to be established; at least 2 nurseries to link to each of the four PPP hatcheries. Supports includes materials, staff training and marketing.



From agreed Results Measurement Table in the Activity Design Document			Data up to and including this reporting period (April 1 – September 30 2022)		Planned target (April 2023 – March 2024)
Planned Indicators	Planned Target	Planned methodology and data source	Actual measurement against targets and data sources	Variance explanation	
				dissemination.	
Increase in supply of high-quality GIFT fingerlings	On average 0.8-1.2 million GIFT fry/fingerlings produced annually by each PPP hatchery	Hatchery monitoring database established within project	<p>Total GIFT SRT fry/fingerlings produced by the hatcheries from Oct 2022 Mar 2023 are:</p> <p>a) Gleno hatchery = 135,027 monosex fry distributed to beneficiaries (producing about over 10,000 brood fry for other hatcheries and distributed to two new to be established.</p> <p>b) Leohitu PPP Hatchery = 313,845 monosex fry</p> <p>c) Parlamento PPP Hatchery = 585,699 Monosex Fry</p>	<p>a) The Gleno hatchery produced about 25% less number of SRT fry during this period compared to the previous reporting period. Gleno is focusing on producing brood fry to supply to other PPP hatcheries.</p> <p>b) The Leohitu hatchery-produced 122% more number of monosex fry during this reporting cycle than the previous reporting period.</p> <p>c) The Parlamento hatchery produced about 31% less than the previous cycle; however, it is still performing well as per the</p>	<p>a) Gleno hatchery will be supported to be able to produce and supply at least 12,000 brood fry every six month to all the PPP hatcheries.</p> <p>b) Leohitu hatchery will be provided with special guidance and support to achieve the target of >0.8 million SRT fry in 2023.</p> <p>Special guidance and support on the seed quality and marketing will be provided.</p> <p>All the PPP hatcheries will be supported to replace quality broodfish regularly acquiring from Gleno Hatchery.</p>



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				plan/target.	
1.2 Improved access to quality feed					
Increase in supply of locally-formulated feeds at local level	3-4 SMEs producing and supplying locally-formulated feeds	Project monitoring records	<p>a) Preparation and feeding of the farm-made feeds continued by a small number of farmers.</p> <p>b) Efforts has been made to establish one SME level feed mill relatively larger production capacity instead of 3-4 SME feed mills</p>	<p>a) Formulation of farm-made feeds was constrained by the severely limited availability of ingredients like rice bran, soybean meals, corn bran etc.; it also indicated that establishment of 3-4 SME level feed mills with reliance on local ingredients only, is not likely to become viable.</p> <p>b) Opportunities for the collaboration with private sector is being explored e.g. CCT (Cooperativa Café Timor) for manufacturing feed utilizing the coffee by-products (coffee pulp) as well as imported ingredients are underway.</p>	At least 1 SME level feed plant involving private sector partners will be established as pilot to help develop in-country supply for the long-term sustainability,
Private sector imported feed supplier	2 private sector suppliers of imported feed		3 private sector feed suppliers imported 78.9 tonnes of fish feed during the reporting period	No. of feed suppliers importing feed and volume of feed import exceeded the target which indicated	Train and assist the private sector partners for importing quality fish feed in bulk to ensure the access to feed at reduced price.



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			(i.e. 13.15 ton/month). A total of 36,690 kg of feed was provided and 30,632 kg was purchased by farmers by themselves for the 5 th and 6 th month of the production cycle.	increasing demand for fish feed in response to scaling up of aquaculture across the country.	Local Service providers (LSPs) will be trained to facilitate supply of feed and fingerlings to make these readily available whenever farmers need.
Price of commercial fish feed pellet	Quality fish feed pellets sold to farmers at <US\$1.25 per kg		The price of imported fish feed pellets in the local market ranged between US\$1.4 and US\$1.5 per kg.	There is a continuing challenge to bring down the price of feed. One of the importers imported feed in bigger volume and sold at lower prices than the others i.e. US\$1.4/kg. This indicates that importing feed in bigger amounts enables further reduction selling price.	Attempt will be made to bring down the price by establishing local feed making plant, and also support a private partner to import feed in bulk to make available at the price close to US\$1.25/kg
1.3 Improved grow out practices in an expanded area					
Increase in pond productivity of GIFT	GIFT yield averages 5.5 t/ha/year	<ul style="list-style-type: none"> ▪ Project monitoring records (Pond record books); ▪ Data from reports of aquaculture 	The estimated productivity upon completion of the harvest of the ongoing cycle is expected that fish productivity will be about two times higher than the targeted.	Feeding of fish with high quality imported feed and stocking of fingerlings at higher density have been introduced with the objective of enhancing the productivity and economic viability in all the 10 farmers' clusters	Data collection, compilation and analysis of current fish production cycle and support to the farmers' clusters for one more cycle will be done,



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Hectares of land under GIFT culture	80 hectares of ponds benefitting from direct and indirect project intervention	project of I/NGOs (Mercy Corps etc)	<p>a) Nearly 5 ha of pond area belonging to PADTL2 farmers clusters was stocked with 240,000 GIFT fry</p> <p>b) Based on the remaining seed produced by the GIFT hatcheries (i.e. 747,207-240,000) sold to other farmers, an estimated area of 17 ha (@3 fry/m² likely to have stocked with monosex GIFT fingerlings, which turns out to be a total of 22 ha of the total pond area. With the new method, two cycles per year are possible, the total area under GIFT culture could reach 44 ha.</p>	<p>a) Total area (direct project intervention) was relatively low because some farmers could not join this stocking as cycle as they already had their old stock in the pond.</p> <p>b) Area of the aquaculture pond might be underestimated because there are some farmers who produce their own fry and grow themselves or sell to other farmers</p>	Total number of GIFT farmers clusters (1 cluster = 15-25 farmers) will be increased to reach 14 by adding 1 farmers' cluster in Parlamento and 1-2 in Hera and Colocau, respectively.
Total GIFT production annually	Total GIFT production reaches 600 t/year from ponds benefitting from direct and		An estimated 60 tons of fish is expected to produce from PADTL2 farmers during the reporting period stocking with	Total production of fish (from direct and indirect project intervention) is estimated to be 400 tons which is the achievement of about 66% as	Total GIFT production target of 600 tons annually to be met through direct and indirect project intervention (sustainable intensification + expansion). Therefore,



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	indirect project intervention		240,000 fingerlings. The remaining 507,000 fingerlings distributed to other farmers should produce about 129 tons assuming that final size of fish is 300 g which means a total of approx. 196 ton (129+67) per cycle and nearly 400 tons per year production is likely in the country.	per the targeted 600 tonnes. Production has impacted due to COVID-19 related impacts because many farmers are still facing challenges of transportation and marketing of their fishes.	activities will be organized adding more ponds and to enhance the productivity.
Overall survival rate of farmed fish (not % change in survival rate)	More than 75% survival rate		Expected survival is over 80% for the present cycle.	The estimation of higher survival rate is expected due to high quality seed and the better management practices implemented in this cycle.	Survival rate of stocked fry to increase to 85% more
Number of households farming GIFT including small-scale IAA, and small and medium sized enterprises (SME) (disaggregated by gender and age group, direct and indirect from project intervention)	1500 households across 4-5 focal municipalities, of which 500 are direct Project intervention farmers comprising 175 raising GIFT at SME scale, 200 practising IAA and		About 500 households in 10 clusters are involved in the stocking of fingerlings in the on-going and previous production cycles across four municipalities namely; Baucau, Lautem, Ermera and Bobonaro PADTL2 has been providing	The expansion of aquaculture last two years was largely constrained due to COVID-19 situation. However, no. of both PADTL2 project participants as well as non-project participants are increasing indicating that the no. of targeted households will likely be met by the end of the project.	Attempts will be made jointly with the Government and other actors to reach more farmers for fish farming. Dissemination materials will be produced to reach out more people, communities and NGOs in more municipalities.



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	the rest continuing as subsistence fish farmers		<p>technical support to a new cluster enrolled by ADRA in Viqueque therefore, there are farmers in 5 municipalities.</p> <p>No. of project farmers and clusters will continue to increase gradually across the country will continue to increase towards meeting the target</p>	<p>Availability of good quality seed and feed, and recruitment of local service providers and establishment of the linkages with markets will increase facilitate the adoption of aquaculture technology</p>	
Output 2: Market-based system approaches developed and utilized to increase access to domestic markets and ensure a consistent supply of food-safe fish and fish products					
Numbers and kinds of marketing chains linking small-scale farmers, farmer clusters and SMEs with demand centers, markets and consumption hubs	<ul style="list-style-type: none"> ▪ 6 operational links established between GIFT farmers and consumption hubs (e.g. schools, hospitals) and local markets ▪ 10 farmer clusters connected to domestic markets for sale of fish 	<ul style="list-style-type: none"> ▪ Aquaculture value chain and market studies report on local market sales and demand, ▪ National MAF aquaculture and fisheries statistics and 	<p>a) Overall, 25.5 tons of fish was harvested from the 10 clusters and sold by farmers during this reporting period. Farmers from Parlamento cluster sold 6.8 tons as the highest amount followed by Leohitu 4.7 tons. Farmers sold their fresh fish mostly to local markets or at the farm-gate or taken to Dili for live sales.</p>	<p>a) Data are available from about 52% farmers across municipalities who have harvested their fish and sold locally. Some farmers are facing problems selling because of poor marketing network and marketing plan. This amount could be double if all of them could have harvested on time.</p>	<p>For the next cycle, higher density will be tested i.e. 7 fish/m² (5 fish /m² in previous cycle) to enhance production from the existing pond</p> <p>The LSPs will be added to reach the target, they will be trained/empowered to serve and</p>



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	and fish products <ul style="list-style-type: none"> ▪ 10 LSP providing services to farmer clusters ▪ 4 private sector entities (supermarket, restaurant) involved in marketing of fish and fish products 	report, <ul style="list-style-type: none"> ▪ National Ministry of Finance Annual Report, ▪ Project monitoring records 	b) Six LSPs have been recruited and linkages have been established between producers and markets. c) Considering the larger volume of fish (estimated 60 tons) being produced to make available for the markets since April/May 2022, establishment of linkages with local municipality markets, Dili supermarkets, etc. was tried. A live shop has been selling live tilapia daily 1-9 kg/day since mid-August 2022. Timor Plaza sold live tilapia on Fridays as a trial, and Loja Agricultura is being planned.	b) Six LSPs have been recruited so far to provide the services and are being trained to enable them	provide more and efficient services More efficient harvesting and transportation and marketing systems / methods will be tried and provided with the technique via LSPs
Farm gate and retail price of locally-farmed fish	Retail price for locally-produced GIFT lowered to \$3.50/kg		The selling price of farmed GIFT ranged between \$3.5 and \$5/kg) with the majority selling at about \$4/kg. Farmers of Lautem (Goa7) sold their fish at the lowest price	Due to the high demand for fish, prices are still high for common people to afford in Bobonaro and Ermera. But with the increase in the volume of fish from the current cycle, the prices are expected to	Prices will be brought down by increasing supply of fish and increasing market linkages and number of fish selling outlets.



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			(\$3.5/kg) while farmers of Laobonu sold at the highest selling prices i.e. \$5/kg.	drop	
Number of fish farmers (by gender) having access to credit for venturing into fish culture at SME level	100 GIFT producers receive credit for fish farming		Farmers are expected to access financial services for the next production cycle	This activity was planned to start in the 2nd year of the Project; however, it was delayed due to the COVID-19 lockdown/movement control.	Attempts will be made to connect framers' clusters with BNCTL to access loan
% increase in household income of GIFT farmer and value chain actors	15-20% increase in household income on average		Actual income will be known after the complete final harvest of the production. A total of US\$84,924 was generated from the fish sales with the average of US\$8,492 (range: US\$1,474 – 21,244). Average per household is USD433 which is almost 50% of the per capita GDP (US\$875).	Based on the data collected and preliminary analysis showed that revenue to be generated from the fish with the intensification of aquaculture is likely to exceed the household income increment target of 15-20%.	Data will be collected and in-depth economic analysis will be done to provide evidences
Number of Micro, Small and Medium Enterprises (MSME) supported (including SME farmers, input suppliers, processing,	225 MSMEs supported, including 175 SME farmers and 50 other MSMEs in the fish value chain and		- 217 farmers have been upgraded to MSME farmers with the increased productivity and income potential - MSMEs in the fish value chain	Target approaching. More detailed monitoring data are being collected and compiled.	Continue to scaling up and scaling out increase MSME farmers and value chain actors to reach 225 MSMEs supported directly by the project



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marketing)	market		to be supported during 2022-2023		
Number of jobs created in fish production, value chain and market	400 jobs created		So far, no. of jobs created who are fully or partially employed in aquaculture industry, are: <ul style="list-style-type: none"> - 217 fish farmers - 16 hatchery staff - 7 nursery operators - 7 feed importers - 6 LSPs - Others to be reported in the subsequent production cycles. 	No. of jobs created so far has not reached the target mainly due to COVID-19 lockdowns and movement restrictions, and because: <ul style="list-style-type: none"> - planned activities were delayed by about 2 years. - Marketing activities have to be shifted from 2nd to 3rd year (2022/2023). - expansion of aquaculture was constrained 	Target to reach /exceed upon expansion of aquaculture clusters and operation of all PPP hatcheries. More comprehensive data compilation and analysis will be done
% change in total volumes (market share) of tilapia entering the marketing chain annually	50% increase in sale of locally-farmed GIFT that enters the domestic markets		25.5 tons of tilapia produced during one cycle ending which about double. Harvesting is yet to be completed - Still about 50% fish are still remained in the farmers pond and ready to sell.	- Increased production was due to shift in the production technique (higher stocking density and making arrangement to supply high quality imported feed.	More comprehensive data compilation and analysis will be done including data from direct and indirect interventions.
Gross annual sales of fish production inputs and tools/equipment directly linked to fish	To be determined		More detailed monitoring data will be collected	-	



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production					
Gross annual value of investment in aquaculture sector leveraged from the private sector, the GoTL and other I/NGO development agencies	To be determined		Yet to be estimated	To be determined	Will be estimated upon 3 rd National Aquaculture Forum in 2023
Output 3: Safe and nutritious fish recipes and products developed and guidelines communicated to consumers on preparing diverse, wholesome meals					
Increases in consumption of fish and fish products	Fish and fish products regularly incorporated in the meal programs of 6 schools and hospitals/health centers in total	<ul style="list-style-type: none"> ▪ Nutrition baseline study; ▪ Ministry of Health and NGOS reports on nutrition and health in Timor-Leste, ▪ Project monitoring records 	<p>Baseline survey completed and the report has been published.</p> <p>This activity was planned to start in the 2nd year of the Project but was delayed due to the COVID-19 lockdown/movement control. Output 3 activities are being implemented in partnership with Mercy Corps.</p>	To be determined by the end line survey	Nutrition end line survey to be conducted in 2023
Fish consumption (% change in quantity and frequency of intake) by species at household level, and by women and young children, by rural areas and Dili	To be determined after the nutrition baseline survey				Nutrition end line survey to be conducted in 2023
% change in practice and knowledge with respect to the	20% increase in Minimum Dietary Diversity (MDD)		End line survey to be done		Nutrition end line survey to be conducted in 2023



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importance of fish and vegetables for healthy diets of women and young children	among women and children participating in Project's activities				
Numbers and profiles (women's groups, health workers, food vendors) of participants in the project's nutrition and hygiene awareness campaigns	To be determined		End line survey to be done		Planned to be conducted in 2023
Output 4: Knowledge generated by the project shared and disseminated within and beyond the country					
Number of technical guides disseminated for better practices on: <ul style="list-style-type: none"> ▪ Hatchery operations ▪ Improved culture practices for GIFT; ▪ Post-harvest and transportation handling; ▪ Production of safe, nutritious fresh fish and 	<ul style="list-style-type: none"> ▪ 4 BMP manuals in Tetum and English for the 3 thematic outputs of the project ▪ 3 promotional materials (e.g. poster) for hygienic and healthy fish-rich diets ▪ 1 fish cook-book based on local recipe 	Project monitoring records	<ul style="list-style-type: none"> ▪ 4 BMPs are under preparation ▪ The Standard Operating Procedures (SOP) for implementing the SME Level GIFT grow-out farming has been drafted. ▪ Knowledge sharing products related to nutrition e.g. Cook-book to be produced in partnership with Mercy Corps 	Production of 4 BMPs delayed due to the delay in the production cycle of fish and other activities which are to be included in those BMPs News brief covering fish harvesting ceremony in Leohitu on 12 August 2022 published; A promotional Video covering PDL2 activities launched. Mercy Corps has started	Complete production of 4 BMP Manuals At least 4 promotional materials (eg posters, Lafaek) to be completed SOP for implementation of SMEs level GIFT grow out systems to be completed



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fish-based products <ul style="list-style-type: none"> ▪ Nutritious meal preparation ▪ Using SBCC tools 				implementation of nutrition related activities of the PADTL2	
Number of communication materials (video, audio, magazines, social media) for campaigns/educational purposes: video on seed production, grow-out technology and IAA, fish-recipe cooking, post-harvest handling, marketing and magazine articles	4 communication materials		<ul style="list-style-type: none"> • A draft of the PADTL2 promotional video has been prepared launched in October 2022. 	More communication materials are planned for the remaining period of the project.	Inauguration of 3 rd PPP and 4 th hatcheries in Colocau, Manufahi and Hera, Dili. Fish harvest ceremony 2023
Number of Timor-Leste aquaculture success story and lessons for scaling to other small-islands nations	2 success stories		<ul style="list-style-type: none"> ▪ <u>Press Release: Prime Minister Taur Matan Ruak meets fish farmers to celebrate successes in scaling up aquaculture production</u> ▪ <u>Timor-Leste Prime Minister advocates for aquaculture development at tilapia</u> 	There are more than targeted success stories and promotional articles from the fish harvest activities published in WorldFish webpages and social media which have been shared.	At least 3 more success stories will be produced in 2023



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			<p><u>harvesting ceremony</u></p> <ul style="list-style-type: none"> ▪ <u>'I eat tilapia every day': Farmers in Timor-Leste achieve higher aquaculture production</u> ▪ <u>Public-private-partnership tilapia hatcheries grow from two to four, increasing access to fingerlings in Timor-Leste</u> 		
Number and level of participation in National Aquaculture Forum (NAF)	One National Aquaculture Forum (NAF) involving 100 participants from a spectrum of stakeholders to be conducted annually	National Aquaculture Forum report	- 3 rd NAF has been proposed for January/February 2022	The NAF was postponed due to delay in implementing the production cycle due to COVID-19. No. of participants is expected to reach over 200.	Third NAF organized on quarter 1 of 2023. All aquaculture stakeholders (including GOs, Funding partners, NGOs and Private sectors) and international experts to be invited.
Number of beneficiaries trained in entire fish value chain (maintaining sanitation and hygiene handling fish and fish products, SBCC, post-harvest handling, processing, packaging, etc)	To be determined	<ul style="list-style-type: none"> ▪ Project baseline, aquaculture value chain, and market studies ▪ Project monitoring records 	a) General project-baseline survey was not possible to conduct; however, a survey as a part of project evaluation has been planned near the end of the project period to compare income of farmers with project intervention verses non-	a) Conducting the baseline survey at the beginning of the project was not possible due to COVID-19-related lockdowns and restrictions of movement for the first 2 years. Indeed, it would be more valid comparison of farmers with and without project supports at the same time,	<p>A brief questionnaire survey will be conducted in 2023 to assess the contribution of the PADTL2 in achieving its objectives</p> <p>A series of trainings/backstopping (Farmers Field school; Fish value chain and market; hatchery management) to be organized during 2023</p>



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			<p>project supported</p> <p>b) Nutrition baseline survey completed – a report has been submitted separately</p> <p>Value chain study completed – (draft report enclosed)</p>	<p>instead of comparing farmers income between the past and future because in later case there will be several compounding factors</p> <p>b) Nutrition baseline survey report published</p> <p>c) Fish value chain study report completed</p>	<p>A nutrition impact survey and value chain studies would be conducted in 2023</p> <p>Nutrition end line survey conducted in 2023</p>



