



## **Part I: Project Information**

### **GEF ID**

10867

### **Project Type**

FSP

### **Type of Trust Fund**

GET

### **CBIT/NGI**

CBIT **No**

NGI **No**

### **Project Title**

Towards Sustainable and Conversion-Free Aquaculture in Indonesian Seas Large Marine Ecosystem (ISLME)

### **Countries**

Regional, Indonesia, Timor Leste

### **Agency(ies)**

ADB

### **Other Executing Partner(s)**

Indonesia: Ministry of Marine Affairs and Fisheries (MMAF) and Ministry of National Development Planning (Badan Perencanaan Pembangunan Nasional, BAPPENAS) Timor-Leste: Ministry of Agriculture and Fisheries (MAF) ?????

### **Executing Partner Type**

Government

### **GEF Focal Area**

International Waters

### **Sector**

Mixed & Others

**Taxonomy**

Focal Areas, Climate Change Adaptation, Climate Change, Climate Change Mitigation, International Waters, Fisheries, Aquaculture, Learning, Coastal, Influencing models, Demonstrate innovative approach, Strengthen institutional capacity and decision-making, Convene multi-stakeholder alliances, Stakeholders, Private Sector, Capital providers, SMEs, Large corporations, Individuals/Entrepreneurs, Civil Society, Non-Governmental Organization, Community Based Organization, Type of Engagement, Information Dissemination, Consultation, Local Communities, Education, Communications, Behavior change, Beneficiaries, Gender Equality, Gender Mainstreaming, Sex-disaggregated indicators, Gender results areas, Capacity Development, Participation and leadership, Capacity, Knowledge and Research, Innovation, Adaptive management, Theory of change, Indicators to measure change, Targeted Research, Knowledge Generation, Pollution, Nutrient pollution from Wastewater, Large Marine Ecosystems, Strategic Action Plan Implementation, Small Island Developing States, Least Developed Countries, Climate resilience, Sea-level rise, Agriculture, Forestry, and Other Land Use, Financial intermediaries and market facilitators, Participation, Academia, Awareness Raising, Knowledge Generation and Exchange, Access to benefits and services

**Rio Markers****Climate Change Mitigation**

Significant Objective 1

**Climate Change Adaptation**

No Contribution 0

**Biodiversity**

Principal Objective 2

**Land Degradation**

No Contribution 0

**Submission Date**

12/9/2022

**Expected Implementation Start**

11/1/2023

**Expected Completion Date**

10/31/2028

**Duration**

60In Months

**Agency Fee(\$)**

400,458.00

**A. FOCAL/NON-FOCAL AREA ELEMENTS**

<b>Objectives/Programs</b>	<b>Focal Area Outcomes</b>	<b>Trust Fund</b>	<b>GEF Amount(\$)</b>	<b>Co-Fin Amount(\$)</b>
IW-1-1	Strengthen blue economy opportunities through sustainable healthy coastal and marine ecosystems	GET	1,334,862.00	24,165,000.00
IW-1-2	Strengthen blue economy opportunities through catalyzing sustainable fisheries management	GET	2,114,680.00	82,000,000.00
IW-1-3	Strengthen blue economy opportunities by addressing pollution reduction in marine environments	GET	1,000,000.00	6,000,000.00
<b>Total Project Cost(\$)</b>			<b>4,449,542.00</b>	<b>112,165,000.00</b>

## **B. Project description summary**

### **Project Objective**

The main project objective is to alter the trajectory towards more sustainable and conversion-free aquaculture production within the Indonesia Seas Large Marine Ecosystem (ISLME). The focus will be on 2 key commodities which are important in the Asia and the Pacific region. For Indonesia, on shrimp to feed value chain as part of the broader shrimp infrastructure supply chain; and in Timor-Leste on the seaweed industry.

Project Compon ent	Financ ing Type	Expected Outcomes	Expected Outputs	Tru st Fu nd	GEF Project Financin g(\$)	Confirmed Co- Financing( \$)
--------------------------	-----------------------	----------------------	---------------------	-----------------------	-------------------------------------	---------------------------------------

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 1: National strategies ??	Technical Assistance	Outcome 1.1: National strategies for priority commodities developed and implemented	1.1.1 National Action Plans for Shrimp Aquaculture adopting aquaculture management area (AMA) approach, including climate change mitigations and resiliency prepared through multi-stakeholder consultations	GE T	570,000.00	2,800,000.00
		(Indonesia and Timor-Leste)	to increase the environmental sustainability of the shrimp aquaculture sector executed			
		<u>Performance Targets:</u>	(Indonesia)			
		Environmental sustainability and ecosystems services targets stated in the seaw strategy are met as planned by 2030 (Timor-Leste)	1.1.2 Marketing and business plan for renovated shrimp sector for greater magnitude of market reach developed			
		A comprehensive shrimp aquaculture plan is in place by 2025 and covers social, environmental and governance issues (Indonesia)	(Indonesia)			
			1.2.1 National Seaweed Aquaculture Strategy prepared through multi-stakeholder consultations			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
			aligned with National Aquaculture Development Strategy to increase the environmental sustainability and ecosystem services of the seaweed sector			
			(Timor-Leste)			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 2: Shrimp feed and shrimp product connectivity	Investment	<p>Outcome 2.1: A credible and functioning feed management system created to connect shrimp feeds to shrimp product to satisfy growing international market demand (Indonesia)</p> <p><u>Performance Targets:</u></p> <p>Feed management system with sourcing guidelines, protocol and traceability system designed, validated and in use by at least two feed mill companies by 2025 with the Feed Mill association of Indonesia committed to promoting/scale up adoption to 25% of members by 2025</p> <p><u>Gender indicator</u></p> <p>At least 30% of trainees women</p>	<p>2.1.1 Two convenings of the Indonesian government, feed and processing sectors to be trained on requirements to access markets of the Seafood Task Force (STF) (Indonesia)</p> <p>2.1.2. Mass balance inspection protocol to validate feed to shrimp tracking generated (Indonesia)</p> <p>2.1.3: Shrimp feed action plan developed (with links to 1.1.1 and 1.1.2 above). System requirements for feed to shrimp tracking co-created by government and industry, and supported by roadmap and execution timeline ? with links to National Strategy for Shrimp</p>	GE T	1,900,000.00	84,040,000.00



Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
			Aquaculture (Indonesia)			
			2.1.4: Five supply chain validation exercises to refine and improve feed to shrimp tracking system supported (Indonesia)			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 3: Amplification of seaweed aquaculture	Investment	Outcome 3.1: Seaweed aquaculture and capture of nutrients from the ocean expanded (Timor-Leste)	3.1.1. <i>Blue carbon credit agreements facilitated for seaweed ecosystem services</i> (Timor-Leste)	GEF	900,000.00	7,000,000.00
		<u>Performance targets:</u>				
		An additional 37.5 ha of seaweed cultivated directly due to project support by 2028	3.1.2: Workshops conducted to develop/implement 1.2.1 and 3.1.1, including representation across key ministries and involvement of relevant civil society and private sector players (Timor-Leste)			
		Outcome 3.2 : Seaweed farmers increase product and adopt sustainable seaweed production techniques				
		<u>Performance targets:</u>				
		The seaweed cultivation area increased from 70 ha in 2022 to 107.5 ha by 2028	3.1.3: Policy and regulatory gap framework analysis from GEF 7 Blue Horizon project adopted and applied to Timor-Leste to generate policy recommendations including zoning, mooring, prevention of marine mammal entanglements			
		Six cultivation areas implement sustainability management plans				

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
			, and carrying capacity (timor-Leste)			
			3.2.1: Sustainable marine resource management and planning demonstrated in Atauro and Metinaro municipalities (Timor-Leste)			
			3.2.2 Improved production and post-harvest handling techniques demonstrated for stakeholders, including at least 50% women, in Atauro and Metinaro (Timor-Leste)			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Outcome 4: Improved Market Linkages	Technical Assistance	<p>Outcome 4.1: Timor-Leste seaweed farmer groups engage with more diverse markets (Timor-Leste)</p> <p><u>Performance Targets:</u></p> <p>Increase in seaweed exports by 375 tonnes due to direct project support by 2028</p>	<p>4.1.1: Seaweed farmer groups strengthened to aggregate and store raw dried seaweeds (RDS) (Timor-Leste)</p> <p>4.1.2: Traders and seaweed farmer group leaders trained in contract brokerage and export procedures (Timor-Leste)</p> <p>4.1.3: Seaweed traders and farmer group leaders network with international buyers (Timor-Leste)</p> <p>4.1.4: Expanded collaboration through 3 workshops with GEF 7 Blue Horizon seaweed aquaculture project participants result in 2 product off-take agreements (Timor-Leste)</p>	GE T	424,542.00	12,000,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
		12 additional seaweed groups aggregating seaweed due to direct project support by 2028	4.2.1: Pre- and post-project inspection by the Seafood Task Force (STF) to understand STF requirements and confirm requirements have been met (Indonesia)			
		<u>Gender indicator:</u>	4.2.2: Feed/shrimp tracking program action plan communicated / socialized and implemented at project sites (Indonesia)			
		Inclusive approaches are followed to ensure the participation of at least 4 women in the strengthening of the capacity of seaweed farmer groups	4.2.3: Supply chain renovations of shrimp traceability, broodstock and hatchery facilities, controlled intensification of farms and product quality and safety controls demonstrated in 5 buyer visits to renovated sites will inform			
		<u>Performance Targets:</u>				

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
		<p>Twenty seaweed exporters trained by the end of 202</p> <p><u>Gender indicator:</u></p> <p>At least 3 women-led enterprises supported to engage with international buyers</p> <p><u>Performance targets:</u></p> <p>Two off-take agreements facilitated and in place by 2028</p>	<p>business and marketing plans for greater market access (see 1.1.2) (Indonesia)</p>			
		<p>Outcome 4.2: Engagement of Indonesian shrimp industry leadership/associations with the Seafood Task Force (Indonesia)</p>				

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
		<u>Performance Indicators</u>				
		<p>At least two feed mills fit integrate feed tracking program across the whole value chain by 2025 in two focal geographies (Java / Sumatra)</p> <p>Feed/shrimp tracking program action plan communicated equally to men and women as target audiences</p>				

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
Component 5: Knowledge Management and IW: LEARN (regional)	Technical Assistance	<p>Outcome 5.1: Full participation in IW:LEARN and knowledge management/communication</p> <p><u>Performance Targets:</u></p> <p>Best practices in feed supply management shared in various Asia-Pacific aquaculture forums such as World Aquaculture or Asia-Pacific Aquaculture lead to creation of community practice</p> <p><u>Gender indicator:</u></p> <p>Women and women's organizations are targeted for sharing of good practice Youth groups, where possible included</p> <p>Knowledge products are developed through gender lens and disseminated to target audiences, including women, women-based organizations, and youth where possible.</p> <p><u>Performance Targets:</u></p> <p>Best practices in feed supply management shared across the regional LMEs where seaweed and shrimp production is important to the economy</p>	<p>5.1.1: Participation in two IW:LEARN regional meetings, one GEF Biennial International Waters Conference (IWC) delivering IW:LEARN experience notes, and in the East Asian Seas (SEAS) Congress by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)</p> <p>(Indonesia and Timor-Leste)</p> <p>5.1.2 Sharing of good practice across GEF-supported large marine ecosystem (LME) / regional SEAS programmes in Asia and the Pacific, including the Indonesia Seas Large Marine Ecosystem</p>	GE T	345,000.00	1,100,000.00



Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
		Lessons learned and knowledge shared through at least 15 knowledge products	(ISLME), Gulf of Thailand (GOT), Bay of Bengal (BOBLME), Sulu Celebes Sea (SCS), Arafura and Timor Seas Ecosystem Action Programme (ATSEA), Yellow Sea LME, and others ? with focus on strategic action program (SAP) implementation (Timor-Leste and Indonesia)			
		MMAF commits to implementing traceability of feeds by 2027	5.1.3 Knowledge management and communications products, such as, a. Lessons on improved production techniques, EEA, marine spatial planning (MSP), private sector engagement, the feasibility of carbon markets, supply-demand			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing(\$)	Confirmed Co-Financing(\$)
			models for different seaweed products for Timor-Leste (Timor-Leste)			
			b. Lessons on aquaculture policy and strategic directions for Indonesia with inclusion of improved tracking of feed through shrimp aquaculture supply chains (Indonesia)			
Component 6: Monitoring and Evaluation	Technical Assistance	Monitoring and Evaluation Plan implemented	Mid-Term Review (MTR) and Terminal Evaluation (TE) conducted	GET	100,000.00	
Sub Total (\$)					4,239,542.00	106,940,000.00
Project Management Cost (PMC)						
GET			210,000.00			5,225,000.00
Sub Total(\$)			210,000.00			5,225,000.00
Total Project Cost(\$)			4,449,542.00			112,165,000.00

**Please provide justification**

**C. Sources of Co-financing for the Project by name and by type**

<b>Sources of Co-financing</b>	<b>Name of Co-financier</b>	<b>Type of Co-financing</b>	<b>Investment Mobilized</b>	<b>Amount(\$)</b>
GEF Agency	Asian Development Bank	Loans	Investment mobilized	93,000,000.00
GEF Agency	Asian Development Bank	Loans	Investment mobilized	8,000,000.00
Recipient Country Government	Ministry of Marine Affairs and Fisheries (MMAF)	In-kind	Recurrent expenditures	11,115,000.00
Private Sector	Seafood Task Force	In-kind	Recurrent expenditures	50,000.00
<b>Total Co-Financing(\$)</b>				<b>112,165,000.00</b>

**Describe how any "Investment Mobilized" was identified**

Investment mobilized has been through ADB's Country Partnership Strategies (CPS) with both Indonesia and Timor-Leste. During the CPS process with each Government a Country Operations Business Plan (COBP) which is essentially an indicative resource framework or pipeline for grants, technical assistance, loans and other types of support. The two loans were identified through this process and the GEF project has been developed concurrent to the preparation of both sets of loans. ADB Loan Indonesia: "Improved Infrastructure for Shrimp Aquaculture Project" (IISAP) (\$93 million) will assist the Government of Indonesia in introducing environmentally sustainable shrimp aquaculture and improving transparency, traceability, and reporting processes towards increased productivity, quality, and profitability of smallholder shrimp farming in 7 provinces. The project will deliver an integrated investment, addressing upstream production and downstream processes through renovated infrastructure, support to improve farming practices and post-harvest systems, and value chain strengthening. There will be three main outputs: 1. Quality and sustainable inputs production increased. This will include the development of a modern broodstock center, 2 multiplication centers, laboratory facilities in 6 locations, regulatory analysis, and facilitation of private sector linkages in broodstock, feed, and hatchery industries. 2. Sustainable aquaculture infrastructure and services developed. This output will promote ecosystem-based aquaculture approaches in "controlled intensification", which will ensure that there will be no conversion of mangrove areas and restoration of currently degraded or abandoned areas. It will finance the construction of infrastructure and facilities (ponds, drains, production facilities, and roads), including operation and maintenance mechanism systems and guidelines for sustainable shrimp aquaculture. These cluster facilities will be built on MMAF land and serve as demonstration models for farmers to replicate. As this cluster approach requires farmers to consolidate their land, the project will support the establishment of farmer-

based enterprises. Technical support packages will be provided to farmers to follow the silvo-aquaculture approach of sparing land outside ponds for mangrove rehabilitation. 3. Shrimp aquaculture value chain strengthened. This output will support farmers in adopting technology for improved quality and productivity, including capacity in broodstock management, disease management, and food safety. Towards improved transparency in the sector, the project will facilitate the registration of broodstock and feed suppliers, farmers, aggregators, and processors into the IndoGAP (Indonesian Good Aquaculture Practice) system. It will train these players to adopt the STELINA system to register transactions and ensure transparency throughout the chain of custody to increase traceability and enable participation in national and international markets. The GEF project will be 'nested' within the above-referenced loan project. The shrimp feed value chain would constitute one (albeit significant) component of a larger, more complex value chain. GEF work will be undertaken with the same government executing entities and their national and local partners and be undertaken in most of the same sites as the loan (refer to Map section).

ADB Loan Timor-Leste: 'Water Harvesting and Agriculture Improvement Project' (\$76 million, of which \$31.5 million will be co-financing for the GEF project). The loan project aims to address issues related to declining agricultural performance and increasing food insecurity in Timor-Leste. It will aim to promote climate resilient and sustainable agricultural productivity. Three main outputs include 1. Climate-resilient farming systems and market linkages developed. The project will (i) apply innovative agroforestry techniques to increase vegetative cover and productivity of agricultural land; (ii) diversify farming systems through the integration of climate-resilient crops, crop varieties, and agricultural practices that are better adapted to the predicted impacts of climate change, and (iii) enhance the performance of value chains for agricultural products with market potential by promoting private sector participation. 2. Community-based water harvesting and flood protection infrastructure constructed. Community-based water harvesting and flood protection infrastructure such as small reservoirs or ponds, tanks, rooftop rainfall harvesting, infiltration trenches, and wells, drains, and local flood protection and erosion control structures will be installed to improve the supply of year-round water for agriculture and other uses and protect people, infrastructure, property, and livelihoods from frequent flooding. This will be supplemented by capacity enhancement for operations and maintenance, among others. 3. Institutional and organizational capacity of farmer groups, communities, and government strengthened. The project will support the expansion of participatory land use planning approaches in target municipalities, including (i) development and adoption of village natural resource management regulations and community-based climate adaptation plans informed by village-level climate change vulnerability assessments; (ii) enhancement of village leaders capacity, at least 30% women, for adaptive management of farmland and natural resources; and (iii) improved access to adaptive farm management and market geospatial information at the sub-district level to enhance local stakeholders' capacity for sustainable climate resilient farm and landscape management.

GEF financing will complement the ADB loan to Timor-Leste by adding a new commodity within a larger project framework that focuses on strengthening value chains for a range of agricultural products. Seaweed represents an additional commodity. GEF-supported work will be undertaken with the same government executing entity and in the same sites (Dili municipality) and smallholder groups as the loan 'which will facilitate consistency and uptake of good practices at the local stakeholder level

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
ADB	GE T	Regional	International Waters	International Waters	4,449,542	400,458	4,850,000.00
Total Grant Resources(\$)					4,449,542.00	400,458.00	4,850,000.00

**E. Non Grant Instrument**

NON-GRANT INSTRUMENT at CEO Endorsement

---

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)  
PPG Required **true**

PPG Amount (\$)  
137,615

PPG Agency Fee (\$)  
12,385

Agenc y	Tru st Fun d	Countr y	Focal Area	Programmi ng of Funds	Amount( \$)	Fee(\$)	Total(\$)
ADB	GET	Regiona l	Internation al Waters	International Waters	137,615	12,385	<b>150,000.0 0</b>
Total Project Costs(\$)					<b>137,615.0 0</b>	<b>12,385.0 0</b>	<b>150,000.0 0</b>



## Core Indicators

**Indicator 5 Area of marine habitat under improved practices to benefit biodiversity (excluding protected areas)**

Ha (Expected at PIF)	Ha (Expected at CEO Endorsement)	Ha (Achieved at MTR)	Ha (Achieved at TE)
200.00	200.00		

**Indicator 5.1 Fisheries under third-party certification incorporating biodiversity considerations**

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
1	1		

**Type/name of the third-party certification**

In Indonesia, under the ADB loan (baseline investment co-financing), one of the outputs will support value chain processes for shrimp aquaculture. This output will build farmers' capacity in brood stock, disease management, food safety and environmentally sustainable production. The loan project will upgrade skills and knowledge of MMAF technical units on sustainable aquaculture and technology. Towards improved transparency, the loan project will facilitate registration of brood stock and feed suppliers, farmers, aggregators and processors into the INDOGAP system and to register transactions in the MMAF STELINA (a transactional information data base). Due to the fragmented nature of shrimp production in Indonesia, the government created their own scheme to harmonize national and international standards. The harmonized regulations capture the main elements of the shrimp value chain. These INDOGAP standards are based on FAO Technical Guidelines and ASEAN Shrimp Good Aquaculture Practices. The Government has established 3rd party certification bodies that will require approval by the Indonesian National Accreditation Committee / Komit Akreditasi Nasional (KAN). Hence the GEF project anticipates under Core Sub-indicator 5.1, one fishery meets national or international third-party certification that incorporates biodiversity considerations.

**Indicator 5.2 Large Marine Ecosystems with reduced pollution and hypoxia**

Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (achieved at MTR)	Number (achieved at TE)
0	1	0	0

LME at PIF	LME at CEO Endorsement	LME at MTR	LME at TE
	<u>Indonesian Sea</u>		

Indicator 5.3 Marine OECMs supported

Name of the OECMs	WDPA- ID	Total Ha (Expected at PIF)	Total Ha (Expected at CEO Endorsement)	Total Ha (Achieved at MTR)	Total Ha (Achieved at TE)
-------------------------	-------------	----------------------------------	---	----------------------------------	---------------------------------

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)	400	750	0	0
Expected metric tons of CO <sub>2</sub> e (indirect)	0	0	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)	400	750		
Expected metric tons of CO <sub>2</sub> e (indirect)	0			
Anticipated start year of accounting	2024	2027		
Duration of accounting	5	10		

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO <sub>2</sub> e (direct)				
Expected metric tons of CO <sub>2</sub> e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

**Indicator 6.3 Energy Saved** (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

	Energy y (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
<b>Total Target Benefit</b>				
<b>Target Energy Saved (MJ)</b>				

**Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology** (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)
------------	--	---	--	---

**Indicator 7 Shared water ecosystems under new or improved cooperative management**

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
<b>Shared water Ecosystem</b>	Indonesian Sea			
<b>Count</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>

**Indicator 7.1 Level of Transboundary Diagnostic Analysis and Strategic Action Program (TDA/SAP) formulation and implementation** (scale of 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
---------------------------	--------------------------------	--	--------------------------------	-------------------------------

**Indicator 7.2 Level of Regional Legal Agreements and Regional management institution(s) (RMI) to support its implementation** (scale of 1 to 4; see Guidance)

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
---------------------------	--------------------------------	--	--------------------------------	-------------------------------

**Indicator 7.3 Level of National/Local reforms and active participation of Inter-Ministerial Committees (IMC; scale 1 to 4; See Guidance)**

Shared Water Ecosystem	Rating (Expected at PIF)	Rating (Expected at CEO Endorsement)	Rating (Achieved at MTR)	Rating (Achieved at TE)
---------------------------	--------------------------------	--	--------------------------------	-------------------------------

**Indicator 7.4 Level of engagement in IWLEARN through participation and delivery of key products**(scale 1 to 4; see Guidance)

<b>Shared Water Ecosystem</b>	<b>Rating (Expected at PIF)</b>	<b>Rating (Expected at CEO Endorsement)</b>	<b>Rating (Achieved at MTR)</b>	<b>Rating (Achieved at TE)</b>
Indonesian Sea		3		

**Indicator 8 Globally over-exploited fisheries moved to more sustainable levels**

<b>Metric Tons (Expected at PIF)</b>	<b>Metric Tons (Expected at CEO Endorsement)</b>	<b>Metric Tons (Achieved at MTR)</b>	<b>Metric Tons (Achieved at TE)</b>
80,148.00	80,148.00		

**Fishery Details**

The intention of the Indonesian component of the GEF support is to cause the improved management of fisheries utilized in shrimp feeds. However, because of the opaqueness of feed supply chains, it is critical that a valid baseline of species used is created. A significant portion of wild caught fish for fishmeal in shrimp feeds is from incidental or indiscriminate catch and often the species are unrecognizable. With an increase in transparency, it is posited that specific fish species used will become more apparent. Please refer to discussion in the GEB section for details on the assumptions and methods.

**Indicator 11 People benefiting from GEF-financed investments**

	<b>Number (Expected at PIF)</b>	<b>Number (Expected at CEO Endorsement)</b>	<b>Number (Achieved at MTR)</b>	<b>Number (Achieved at TE)</b>
<b>Female</b>	1,784	1,784		
<b>Male</b>	1,843	1,843		
<b>Total</b>	3627	3627	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Refer to the narrative sections on "Global Environmental Benefits" and also "Benefits" (or additional co-benefits). In Timor-Leste: Ecosystems Approach to Aquaculture (EAA) will be carried out in six sites. It is expected 50 farmers in each site will complete the training and

receive some inputs to establish seaweed beds, equivalent to 50 lines of seaweed each, which totals 6.25ha in each site. Seaweed production will be increased by 37.5ha in all sites. Considering the halo effect of seaweed and better management due to EAA, it is expected 200ha of marine habitat will come under improved practices to benefit biodiversity. Assuming a yield of 10 tons of seaweed (dry weight) per hectare/year, seaweed production on the 37.5ha will be 375 tons. The carbon content of seaweed varies by species but a conservative estimate is that for every 5 tons of dry seaweed produced, 1 ton of carbon is sequestered. This will result in 75 MT of green house gas emissions mitigated per annum - so with duration of accounting for 10 years this amounts to 750 MT. For Indonesia: Wild fish calculation methodology According to the FAO, Indonesia produced 191,300 metric tons (t) of black tiger shrimp (*Peneaus monodon*) and 697,100 t of whiteleg shrimp (*Litopenaeus vannamei*) in 2019. Estimating the amount of feed for tiger shrimp is difficult because feed is not necessarily used for the traditional production of shrimp. Because most whiteleg shrimp is fed and an FCR can be estimated to be 1.3 tons of feed per ton of whiteleg shrimp, the total amount of feed used is:  $697,100 \text{ t whiteleg shrimp} \times (1.3 \text{ t of feed}) / (1 \text{ ton of shrimp}) = 906,230 \text{ t of feed}$  Data provided by Indonesia feed mill association suggested (GPMT) that the total amount of shrimp feed produced in Indonesia in 2019 was 352,248 t. MMAF suggested that the total amount of feed imported in 2019 was 46,229 t. From these estimates, the total amount of feed used for shrimp production in Indonesia in 2019 is 398,477 t. If all this feed was used to produce whiteleg shrimp, with the assumed 1.3 FCR, this would amount to 306,520 t of whiteleg shrimp produced in 2019. The discrepancy in the data from FAO and from GPMT/MMAF suggests a 2-fold error. If exported shrimp was used for this calculation, data from the Directorate General of Aquaculture in 2020 suggest a total volume of exported shrimp to be 161,449 t. This is an estimate of exported whiteleg shrimp and black tiger shrimp. Assuming the same FCR of 1.3, the total amount of feed for exported shrimp would be of shrimp to be 209,883 t feed. This figure is closer to the estimated feed volume provided by the GPMT/MMAF, if the difference between the total amount of feed used (GPMT/MMAF) 398,477 t and the amount of feed used for exported shrimp production 209,833 t represented feed for shrimp consumed in Indonesia ( $398,477 \text{ t feed total} - 209,833 \text{ t feed used for exported shrimp} = 188,593 \text{ t feed for shrimp produced for domestic consumption}$ ). Of course, this still does not address the magnitude difference in production statistics reported by FAO. Dress out the percentage of specific shrimp products exported may be considered as a source of error. If one assumes an approximate dress-out or processed weight percentage of 50% of the unprocessed shrimp, the volume of exported product (primarily to the US, thus head-off), will double the overall shrimp production that was exported ( $306,520 \text{ t shrimp} / 0.5 = 613,040 \text{ t unprocessed shrimp produced}$ ). These figures are closer to those reported by FAO. Greater effort will be needed to understand how these figures are gathered and what they represent. For the purposes of determining the amount of fish used for shrimp feed at this stage in the project, production numbers from the Shrimp Club Indonesia (SCI) will be used. In 2018, the volume of shrimp produced was 390,000 t. Approximately 90,000 t of black tiger shrimp

(extensive and semi-intensive) was reportedly produced. Thus, approximately 300,000 t of whiteleg shrimp and 90,000 t of black tiger shrimp were produced in 2018. Recalculating the amount of feed for whiteleg shrimp using the assumption of an FCR of 1.3, the calculation is as follows  $300,000 \text{ t whiteleg shrimp} \times (1.3 \text{ t of feed}) / (1 \text{ ton of shrimp}) = 390,000 \text{ t of feed}$ . The feed volume of 390,000 t is similar in magnitude to the total amount of feed reported by GPMT and MMAF used in 2019 for both species of shrimp (398,477 t). Of course, the remaining amount of feed (8,477 t) will be considered used for semi-intensive black tiger shrimp production. If an FCR of 1.5 is assumed for black tiger shrimp produced on feed for 2/3 of the production cycle, the calculation to determine the shrimp volume produced with this feed is as follows:  $8,477 \text{ t black tiger shrimp feed} \times (1 \text{ t shrimp}) / (1.5 \text{ t of feed}) = 5,651 \text{ t of black tiger shrimp}$ . The black tiger shrimp production of 5,651 t will be considered on feed for 100% of the production cycle. However, semi-intensive production typically entails the use of feed following the first 1/3 to 1/2 of the production cycle. If the feed is assumed to be used during the second half of the production period, the calculated volume of black tiger shrimp produced through semi-intensive methods will double, i.e.  $5,651 \text{ t} / 0.5 = 11,303 \text{ t of black tiger shrimp}$  produced in semi-intensive culture systems. Thus, the production of black tiger shrimp production in extensive or traditional systems without the use of feed will be simply the estimated production of black tiger shrimp provided by the SCI minus the 11,303 t shrimp, i.e.  $90,000 \text{ t black tiger shrimp} - 11,303 \text{ t black tiger shrimp on feed} = 78,697 \text{ t black tiger shrimp}$  produced extensively. Fish oil is expensive and used sparingly in aquaculture feed. Fishmeal, however, is commonly used as it tends to have the amino acid profile best suited for aquatic organisms. The amount of fishmeal used in feeds tends to be a mystery unless you have worked in a feed mill. Even then, production practices are not always uniform. For the purposes of these calculations, estimates of fishmeal inclusion in Indonesian shrimp feed are 5% and 7% for whiteleg shrimp and black tiger shrimp, respectively. Thus, the amount of fishmeal used in Indonesia can be estimated at:  $[(390,000 \text{ t feed for whiteleg shrimp}) \times 0.05] + [(8,477 \text{ t of feed for tiger shrimp}) \times 0.7] = 195,593 \text{ t of fishmeal}$  for shrimp feed in Indonesia. Because the targeted fisheries for this project are in the ISLME, and anecdotal reports suggested that approximately 60% of Indonesia's fishmeal sourcing is local, approximately 40% of the total fish meal will be omitted as it is presumed to be imported.  $195,593 \text{ t of fishmeal used for Indonesian shrimp} \times 0.6 = 117,356 \text{ t Indonesian sourced fishmeal}$ . The amount of fishmeal that can be rendered from 1 t of wild fish (wet weight) is 22.5%. The corresponding volume of wild fish (presumed sourced from ISLME) that will be required to satisfy Indonesia's shrimp feed manufacturing demand can be calculated as follows:  $(117,356 \text{ t fishmeal}) / (22.5 / 100) = 320,592 \text{ t wild fish from Indonesia}$ . It is unknown what species of fish are used in fishmeal in Indonesia. One study from 2013 noted *Sardinella longiceps*, *S. sirm*, *S. leigaster*, *S. clupeoides*, and by-catch as the primary fisheries used for Indonesian-produced fishmeal. Without clear data provided by fishmeal renderers or feed companies, it is not possible to determine the impact this project intends to have on specific fisheries. However, because of the innovative nature of this project and the push for greater transparency, the desired outcome is to affect 25% of the Indonesian

fisheries used for fishmeal in this project. Thus, 25% of 320,592 mt Indonesian wild fish used in fishmeal is 80,148 mt under improved management (Core Indicator 8: 80,148 mt wild fish move to more sustainable levels). IW:LEARN: Rating of 3 provided despite budget and plans to attend IWC and other events. This will be reviewed during project inception and at mid-term evaluation. Number of beneficiaries: The direct beneficiaries for the Indonesian component of the project are expected to be in the form of farmers with better access to feed information and greater transparency up and down the shrimp and feed supply chains. In Timor-Leste the direct beneficiaries will be seaweed cultivators in the project areas. The beneficiary breakdown is below: INO TIM TTL Males 1663 180 1843 Females 1664 120 1784 TOTAL 3327 300 3627

## Part II. Project Justification

### 1a. Project Description

#### Global environmental and/or adaptation problems, root causes, and barriers

##### *Project scope and environmental significance*

Aquaculture in the Indonesian Sea Large Marine Ecosystem (ISLME) is vast and varies in scale, species grown, intensity level, target market, and environmental and social impact. Two important species groups of aquaculture are shrimp and seaweed. Farmed shrimp is the most valuable, traded seafood in the world by volume, and seaweed is the largest volume of marine aquaculture products produced globally. Approximately 90% of shrimp and 99.5% of seaweed are produced in Asia<sup>[1]</sup>. Shrimp and seaweed, together, embody the best and worst of aquaculture, and the positive benefits of seaweed far outweigh any negative impacts from its production. In contrast, farmed shrimp has a significant environmental footprint but with great value for farmers and supply chain actors. Another clear difference between shrimp and seaweed is that shrimp are fed, and seaweed is not. Fed aquaculture will have accompanying environmental and social liabilities of an order of magnitude greater than unfed aquaculture because of the lack of accountability and transparency in feed supply chains. Without the need for feed, seaweed's liabilities are only in the growing and processing of the product. Because ADB is executing a \$93,000,000 loan to the Indonesian government to renovate and reimagine shrimp farming and another loan to Timor-Leste for water harvesting and agroforestry supply chains, resources to mitigate the shrimp feed value chain impacts on marine organisms and promotion of more and better seaweed cultivation for greater ecosystem services is in alignment with targets of the ISLME. Both increasing water quality through seaweed and reducing bycatch from trawl fisheries will have positive health benefits for ISLME. Still, it could also have much greater regional value for how aquaculture value chains can be more sustainable, free from habitat conversion and overfishing, and provide livelihoods and nutritious food for a growing global population.

The economic value and the livelihoods generated through shrimp farming and the resultant supply chains are stark, as is the damage shrimp aquaculture has had on coastal environments in the tropics. Some of these damages include habitat degradation of coastal wetlands, nutrient pollution of coastal waters, bycatch of ocean species during the collection of shrimp broodstock or shrimp seed, chemical, and therapeutic use and discharge, and an overall large natural resource footprint. Approximately 40% of all shrimp farming land used only produces 6-11% of farmed shrimp; thus, the remaining 60% of shrimp farming land produces nearly all the shrimp in the world.<sup>[2]</sup> Controlled intensification coupled with commitments for no further habitat conversion for shrimp farming is a growing trend. Closed systems are becoming more common because of water purification strategies and to reduce vectors from the wild that can transmit disease. These are positive trends. However, one facet of aquaculture, specifically shrimp aquaculture, has created harm with no accountability in the feed sector.

The feed supply chains in SE Asia are opaque at best and, more reasonably, could be referred to as a "black box". Each ingredient carries environmental harm, food safety, and labor and human rights abuse liabilities. Feed ingredients used by feed mills are kept secret because the manufacturers claim the intellectual property of the feed formula. The reality is that no oversight is present in the feed supply chain. They are not only masked by the secretive nature of their ingredient formulations, but they also have no direct engagement with retail and food service companies that buy their products that their feed was used to grow. The shrimp supply chain is riddled with fraud and corruption, including feed manufacturers and feed ingredient suppliers. One of the major forms of protein included in feed

---



formulations for shrimp is that of marine ingredients (fishmeal and oil). However, it is unclear what marine ingredients are used ? claims of the imported fish meal are not validated, and the conventional means of procuring marine ingredients is through purchasing the non-marketable or non-edible marine organisms collected as bycatch in indiscriminate trawl fishing. In essence, the shrimp aquaculture sector has created a market for a greater indiscriminate catch of marine organisms.

Seaweed is the largest form of marine aquaculture representing over half of all production in the marine environment. It does not require fresh water or feed inputs, chemicals and therapeutants, land conversion, or fertilizer. Seaweed grows in waters through the absorption of nutrients coupled with photosynthesis. The net result of seaweed aquaculture is the extraction of carbon dioxide (reducing acidity), nitrogen, and phosphorus from the ocean and an algal protein that produces dissolved oxygen in the water and nourishes people. Additionally, seaweeds, through the sluffing off of biomass during growth, can potentially sequester 40% of the carbon they take by conversion to ?ocean snow?. Ocean snow refers to the silt-like particles of seaweed that are transported to deep ocean trenches and settle to the bottom in anoxic zones where that organic matter cannot decompose for hundreds of years.

Seaweed cultivation can contribute to the urgent need to address climate change through various mechanisms, including, among others: (i) human foods, animal feeds, and fertilizers that have a relatively low carbon footprint; (ii) capturing or sequestering carbon; and (iii) reducing methane emissions from cattle farming that uses certain seaweeds as a feed supplement. Other direct or indirect environmental benefits and ecosystem services of seaweeds include (i) providing habitats for fish and other marine organisms; (ii) serving as a buffer against strong wave action to protect the shoreline; (iii) reducing overfishing through providing alternative livelihoods to fishing communities; (iv) improving soil conditions and potentially reducing agricultural pesticides through seaweed-based biofertilizer or bio-stimulants, and (v) producing readily biodegradable goods and packaging. In addition to the environmental benefits and ecosystems provided, seaweed cultivation contributes to household nutrition and income generation[3]3.

Shrimp and seaweed can be viewed as being on opposite ends of an impact spectrum where shrimp aquaculture produces some of the highest negative environmental impacts while seaweed aquaculture provides more positive environmental services and little negative impact on the environment. The reality in the production of these types of aquaculture species is that both are widely cultured. While seaweed may provide more positive attributes, shrimp is more valuable and is currently a large portion of global aquaculture. In short, we must be able to mitigate the shrimp supply chain impacts while amplifying the seaweed supply chain impacts. Environmental management requires that we not only identify new solutions but we change more harmful activities to reduce aquaculture?s burden on the environment.

This project will work across the ISLME to mitigate the impacts of marine ingredients in shrimp aquaculture feed in Indonesia through greater accountability and transparency in the shrimp feed supply chain and increase ecosystem services and ocean water quality through value generation for seaweed farmers.

The project will utilize the market forces of the Seafood Task Force (STF) to bring leverage and current market demands to the project to demonstrate the need for better feeds in shrimp. The project will also work with the Safe Seaweed Coalition to improve market linkages with seaweed off-takers. The project will work at the national level in ISLME with the executing agencies for Indonesia being the Ministry of Marine Affairs and Fisheries (MMAF) and Ministry of National Development Planning (BAPPENAS) and for Timor-Leste, the Ministry of Agriculture and Fisheries (MAF), respectively. Lastly, because of the private sector engagement in the GEF 7 Blue Horizon seaweed project, we are in close communications with the Southeast Asian Fisheries Development Center (SEAFDEC) on how market actions and insights, as well as zoning and siting, can be transferred from their work to Timor-Leste.

### ***Environmental problem and root cause***

---

The ISLME is one contiguous large marine ecosystem, with ecological, social and economic interdependencies across its full extent. The literal erosion of the ISLME's foundation is occurring? coral bleaching destroys reefs, mangrove loss reduces critical habitat, calcium carbonate to buffer the water's pH is dissolving, nutrient pollution requires greater oxygen for the decay of organic matter, suspended solids reduce sunlight penetration and photosynthesis, and rising temperature accelerates all the kinetics of these processes. In addition, as aquaculture grows and fisheries habitats degrade, the demand for food and ingredients in feed on this living ecosystem are compounding and conflicting. The environmental stressors of a compromised marine ecosystem and the over-exploitation of fisheries with little to no accountability create significant cause for alarm. Moreover, in the case of marine ingredients used in feed, the masking of the supply chain, the fragmented and disaggregated nature of the shrimp supply chain, the disconnected nature of feed mills from global market forces for positive change, and the sheer absence of transparency creates a scenario where maximum damage can be inflicted with no repercussions.

Shrimp farming is a lucrative business. In Asia, a shrimp farmer can lose two out of three crops and remain profitable. This means shrimp farming is here to stay. Few other livelihoods have that kind of return on investment for farmers. However, the shrimp sector in Asia has tended to de-risk processing and feed from farming. This is primarily because farming is the most volatile node in the supply chain. By processors maintaining smallholders in a disaggregated manner, relatively cheap shrimp with little transparency or traceability can be collected at any time of the year. The shrimp feed sector also benefits from smallholder farmers in supply chains that are forced to believe the advice they receive from the feed vendors who sell farmers the feed ? in many cases; this is because the farmers are receiving an advance in payment in the form of feed or chemicals to grow their next crop of shrimp. Thus, because the farmers are disempowered and disaggregated, they do not have the leverage to make requests to feed companies. As farmers are the only feed users, there are no other mechanisms to foster greater accountability in the feed supply chains. This lack of accountability results in overfishing and illegal, unreported, and unregulated (IUU) fishing continuing and increasing, and habitat conversion going unchecked because the source of ingredients is unknown. Solving the feed accountability issue is paramount for the shrimp sector. If left unchecked, not only will the harm continue to grow, but fewer actors, such as ADB, will be willing to invest in reforms to the sector.

It is important to note that certification in shrimp aquaculture has challenges[4]4 that have, in some cases, masked the actual activities that occur in shrimp supply chains[5]5. For example, in 2014, when labour and human rights abuses were identified in the Thai shrimp feed supply chain, certified feed mills with these marine ingredients being used had been certified. The feed mills had the certification before the Guardian and AP (Associated Press) reports came out. The feed mills maintained their certification during the crisis and currently retain it. There needs to be a force of honesty and transparency to truly reform the shrimp feed sector and achieve the changes necessary to increase the sustainability of shrimp farming.

The true potential for unlocking the ?seaweed solution? for the ocean lies in market diversification and increased demand for these new markets. However, accessing these markets requires suppliers to meet customized specifications for protein content, freshness, water content, and hygiene. Failed seaweed livelihoods occur when their products are rejected from the market for lack of adherence to product specifications. The poor quality of products, in addition to being rejected from markets, also leads to other livelihoods being sought. Losing seaweed livelihoods removes the ecosystem services those livelihoods produce, and with the current condition of coastal environments in ISLME, we need more ecosystem services than less. It behooves us to engage and solve the loss of seaweed aquaculture livelihoods.

The further development of seaweeds in global aquaculture faces multiple issues, constraints, and challenges. The most universal challenges include: i) limited or uncertain demand for seaweed, ii) limited or reduced availability of suitable farm sites nearshore, iii) shortage of labor and iv) low or declined

---

seedling quality. Other constraints include a deteriorating farming environment due to rising seawater temperatures due to climate change; more frequent and severe disease outbreaks; high transportation costs; high intermediary costs; low and fluctuating prices and uncertain export prices due to fluctuating exchange rates (although prices are currently high); low incomes for seaweed farmers; poor farm management such as premature harvesting owing to financial constraints; low quality due to inappropriate post-harvest handling; and, lack of value addition.[6]6

***Barriers to scaling shrimp feed accountability include the following***

While the shrimp industry has seen some professionalization in increased intensity and more significant investments, most shrimp farmers are still small-scale and disconnected from major supply chain components. The barriers to greater feed accountability rest in government policy and oversight, supply chain organization, transparency, and market pressures. The benefit of having the ADB co-financing loan in the proposed project presents an opportunity for more significant policy and supply chain leverage to enable the requirements for greater feed ingredient accountability. The proposed project would fill a specific gap that could transform the sector in Indonesia. Barriers to accountability in feed and scaling of seaweed aquaculture and achieving corresponding environmental benefits include the following:

***Shrimp Aquaculture Feed Accountability - Indonesia: Limited traceability of farmed shrimp from processing plant to farm***

Processing farmed shrimp requires sorting sizes and product quality for different markets. Because the shrimp industry is so fragmented, shrimp middlemen will combine many harvests from multiple farms to gain enough volume for sale to the processing plant. Because of this, traceability is absent from the processing plant to the farm. To gain greater insight and create interventions to improve the environmental impact of feed ingredient supply chains, it is necessary to have a traceability system that provides clear tracking back to the farm. Once the farmer is identified, a feed tracking system can be developed and implemented.

***Shrimp Aquaculture Feed Accountability - Indonesia: Unmasking the shrimp and shrimp feed supply chains***

As with the lack of traceability of shrimp products to shrimp farms, there is a need to engage the international market buyers to teach them that the systems and certifications they have demanded are not delivering, and a renewed focus on the reality in supply chains is required. In many respects, certifications have moved from an intervention to promote greater stewardship to a scapegoat that can be blamed when supply chain problems emerge. The starkest example of this is the Best Aquaculture Practices (BAP) certification in Thailand, which is still being requested by buyers that fully recognize its failures to deliver on supply chain oversight. Unmasking the true conditions of the supply chain are necessary to intervene effectively for environmental gains. The unmasking, however, will go against the norms, and many actors in the supply chain will be averse to this engagement unless the stringent policy is developed and enforced, plus the right international market actors that want to know the truth are engaged.

***Shrimp Aquaculture Feed Accountability ? Indonesia: Supply chain organization and oversight***

This project will be undertaken in close alignment with a loan on shrimp processing infrastructure, which will have many touch points and leverage opportunities for different supply chain actors. Organizing the shrimp value chain in Indonesia ? even a portion of it ? will be incredibly challenging. Still, the various aspects of what other institutions are doing now, the GEF opportunity and the ADB loan, create a scenario in which multiple large forces could converge to create a window of opportunity.

The farmers are unaware of market demands, and the middlemen shield farmers from knowledge about markets and pricing. The current system works best for the middlemen, who are the key to unlocking the supply chain, but they are disincentivized to do so because they control the product flow and cash flow to and from the farmers. The middlemen must be leveraged by processors, feed companies, international market actors, and the Indonesian national and local governments. The effort to organize the supply chain

---

requires knowledge sharing, and those that block this knowledge will need to change or be removed for the success of this project.

***Barriers to scaling seaweed aquaculture and achieving corresponding environmental benefits include the following***

The seaweed industry is also disaggregated, but the fragmentation challenges are largely the inability to demonstrate and share knowledge on better post-harvest handling of seaweeds and farmers beholden to the traders that purchase the product. To create greater value for seaweed farmers is to create more demand for seaweed aquaculture resulting in greater environmental gains from the ecosystem services.

***Seaweed ? Timor-Leste: Unsure demand and volatile prices***

As seaweed production in Timor-Leste is less than 0.001 percent of global production, the country has little market power, and exporters are dependent on selling to a small number of off-takers who supply the carrageenan market. Although RDS prices are currently high, demand can vary, and prices are volatile. To reduce risk and improve the resilience of the value chain, the target market must be diversified through seeking additional buyers and new end markets.

***Seaweed ? Timor-Leste: An enabling and sustainable environment to support sector growth***

As seaweed production increases in Timor-Leste, there is a growing need to better manage resources, which will require Marine Spatial Planning and include ?zoning? for the various users, e.g., tourism, fishing, and salt production. Licensing for seaweed farming will also be required to provide secure tenure and monitor carrying capacity.

There are constraints to the amount of nearshore aquaculture that can be accommodated in Timor-Leste. The country is not close to reaching this point at this time. However, other nations? lessons indicate that zoning for aquaculture will provide ample ?relief? area for boat travel from shore to fishing grounds and not encroach on sensitive benthic habitats such as coral reefs and seagrass beds. While there are advantages of moving cultivation structures further offshore, there are constraints in managing more daily maintenance activities because of distance to shore, storms, and dynamic ocean currents?which must be included in the national strategies and plans. Developing a quality product that can be sold for a price that meets higher specifications is the primary factor that will allow Timor-Leste the ability to grow its seaweed aquaculture sector. Expansion and spatial plans will be necessary once it can be demonstrated that this level of product quality can be achieved.

## **Global baseline scenario and associated baseline project**

**Shrimp** is a popular seafood item with high consumer demand, making it the most valuable seafood commodity globally. The ocean catch of shrimp has been comprised of 35.8?43.5% penaeid shrimp since 1980[7]7. Farmed shrimp comprised 63.5% of total global shrimp production (wild plus farmed), and approximately 472,000 t of freshwater shrimp were produced in 20194. Freshwater shrimp and penaeid shrimp farming represent the majority of shrimp aquaculture globally (Fig. 1). The top 5 shrimp producing countries by aquaculture are China, Indonesia, Viet Nam, India, and Ecuador (Fig. 2). Indonesia had a global market share of 7.1% in 2019[8]8. Global shrimp production is expected to grow by more than 5.2% annually[9]9. The main farmed shrimp species is the whiteleg shrimp (*Litopenaeus vannamei*), accounting for 80% of production, which is produced by large companies and around half of the smallholders[10]10. The other half of the smallholders cultivate the tiger shrimp (*Penaeus monodon*) extensively[11]11.

---

In 2019, Indonesia exported shrimp products equivalent to \$1.2 billion to the European Union, Japan, and United States<sup>[12]</sup>.

The proliferation of certifications and other types of purchasing screens put in place by international markets has been a large attempt at "professionalizing" the shrimp aquaculture sector such that liabilities for food safety and environmental and social impacts do not create challenges for retail and food service companies in major consuming nations such as the USA, EU nations, or Japan. These systems have proven ineffective in addressing the concerns of the shrimp sector for two main reasons: (1) traceability was not and is still not in place during and after the growth of certification schemes. This lack of traceability results in a sector rife with fraud, and (2) the lack of controls on feeds and feed ingredients has proven problematic for international brands sued for the liabilities in the feed ingredients supply chains. The lawsuits filed on international brands are a sign of the ineffectiveness of certification in remedying challenges in the shrimp sector more broadly. However, it also highlights how difficult it can be to accurately depict and understand shrimp aquaculture and shrimp feed supply chains.

Figure 1: Global aquaculture production of shrimp, by species. "Shrimp" is defined as the taxonomical order *Natantia*.

Source: FAO. 2021. *Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019* (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.  
[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

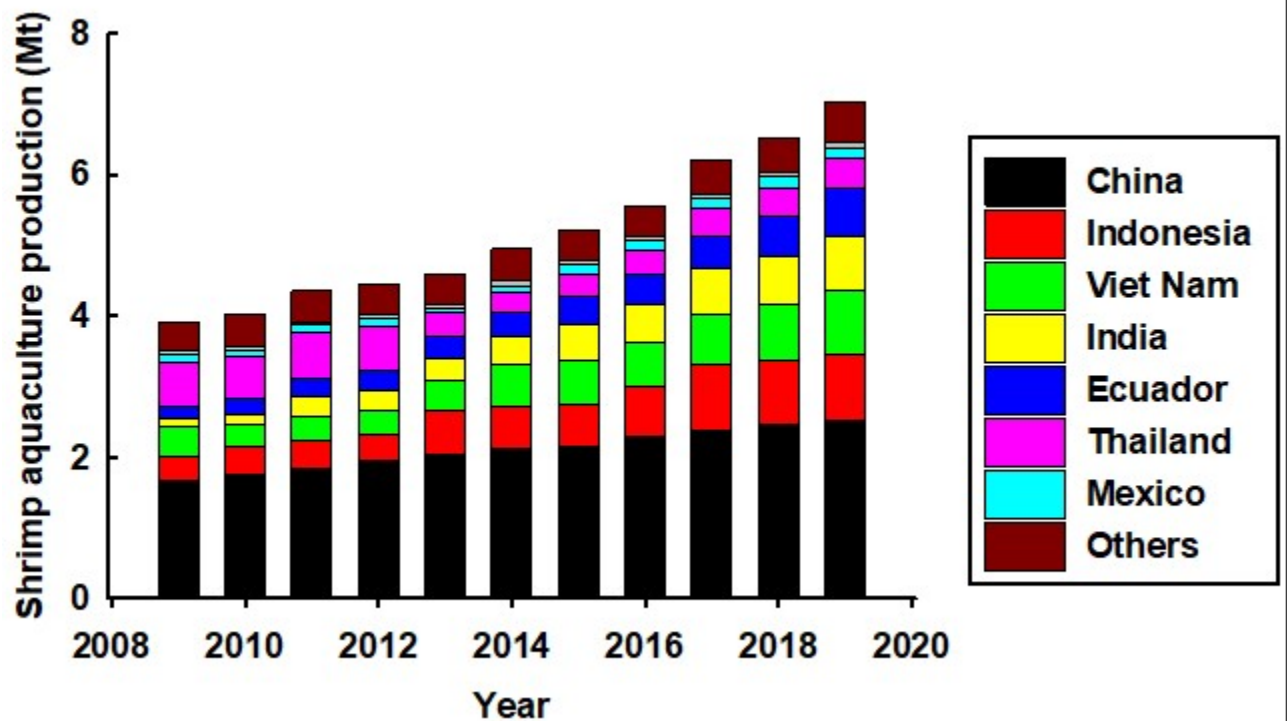


Figure 2: Global shrimp aquaculture production by top producing countries over the past 10 years. "Shrimp" is defined as the taxonomical order *Natantia*.

Source: FAO. 2021. *Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019* (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.  
[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)



Shrimp culture remains one of the most lucrative livelihoods in Asia because of the strong, established, and growing markets in major consuming countries. Growth in shrimp demand will continue and shrimp farming will remain a significant component of Asian and SE Asian economies. While the shrimp aquaculture potential is high, several barriers constrain its growth and sustainability. Smallholder farming profitability is constrained by the lack of economy of scale, limited access to finance, unsustainable farming infrastructure and practices, and low bargaining power with aggregators. The low level of certification of farmers, aggregators, and processors also limit the ability to properly trace products, further limiting international buyers' confidence. As the demand for sustainability grows, there is a need to shift toward responsible and transparent production and sourcing of feeds. The challenges that exist in the shrimp aquaculture sector must be addressed to create a more sustainable food commodity and bring impacts down to a more tolerable range to maintain support for an industry with a vast livelihoods footprint.

Global **seaweed aquaculture** increased by 53% from 2009 to 2019, resulting in a total annual seaweed production of over 34 Mt.<sup>5</sup> The most common seaweed species produced through aquaculture are *Eucheuma* spp., *Laminaria japonica* and *Gracilaria* spp., which combined represent over 74% of all seaweed produced through aquaculture. Nearly all seaweed in the world is from aquaculture because of overharvesting of seaweed from the wild, warming ocean temperatures, and increased ocean acidification. Approximately 85% of seaweed production is used in food products, while extracts from seaweed make up the remaining. Carrageenan, the most popular seaweed extract, is used in pet food, dairy and meat industries, and pharmaceuticals. Asia contributes most to farmed seaweed production, with China, Indonesia, and the Philippines representing the top seaweed-producing countries by volume (Fig. 4).

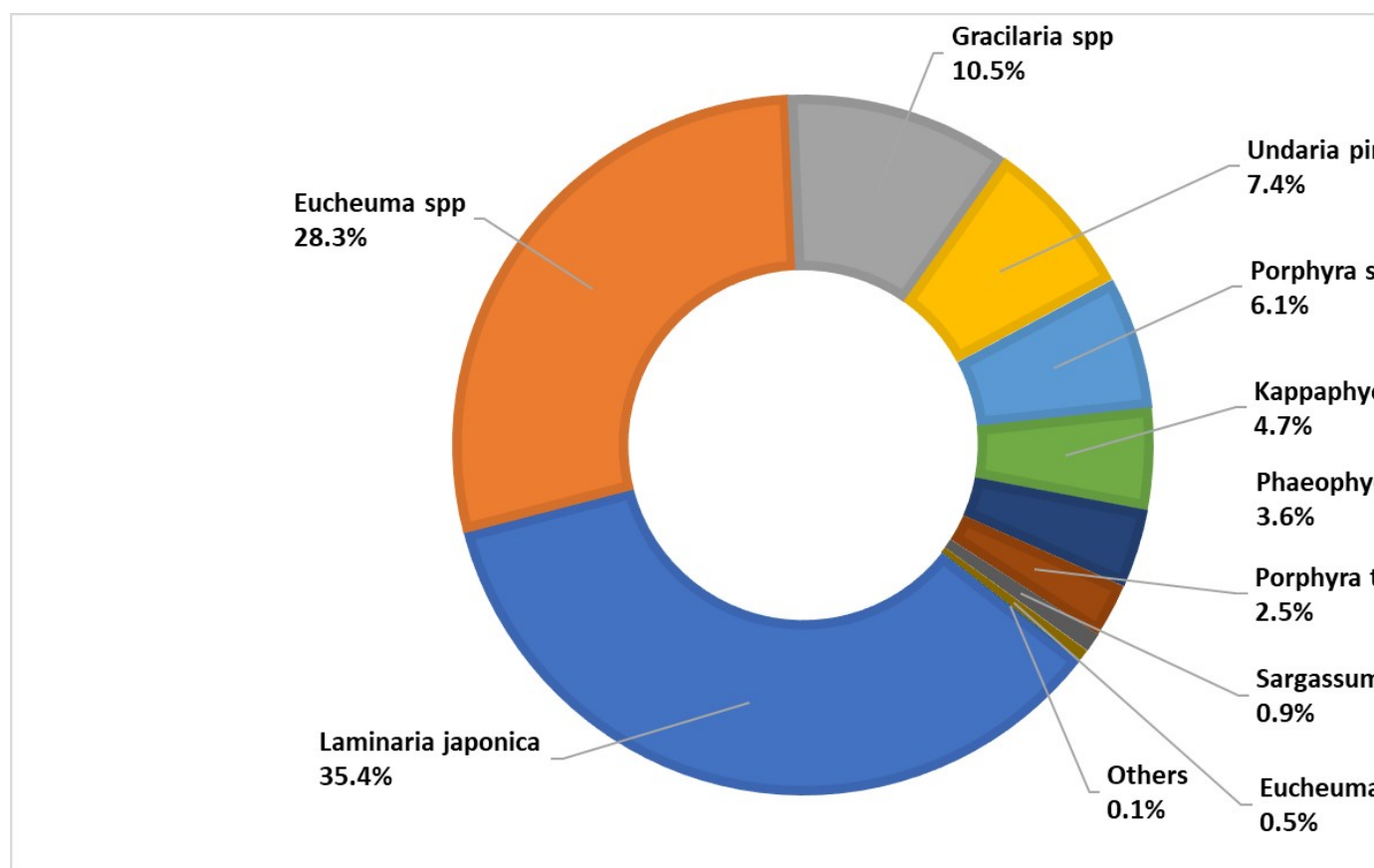


Figure 3. Global aquaculture production of seaweed, by species. "Seaweed" is defined as the taxonomical orders of Chlorophyceae (green seaweed), Phaeophyceae (brown seaweeds) and Rhodophyceae (red seaweeds).

Source: FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.

[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

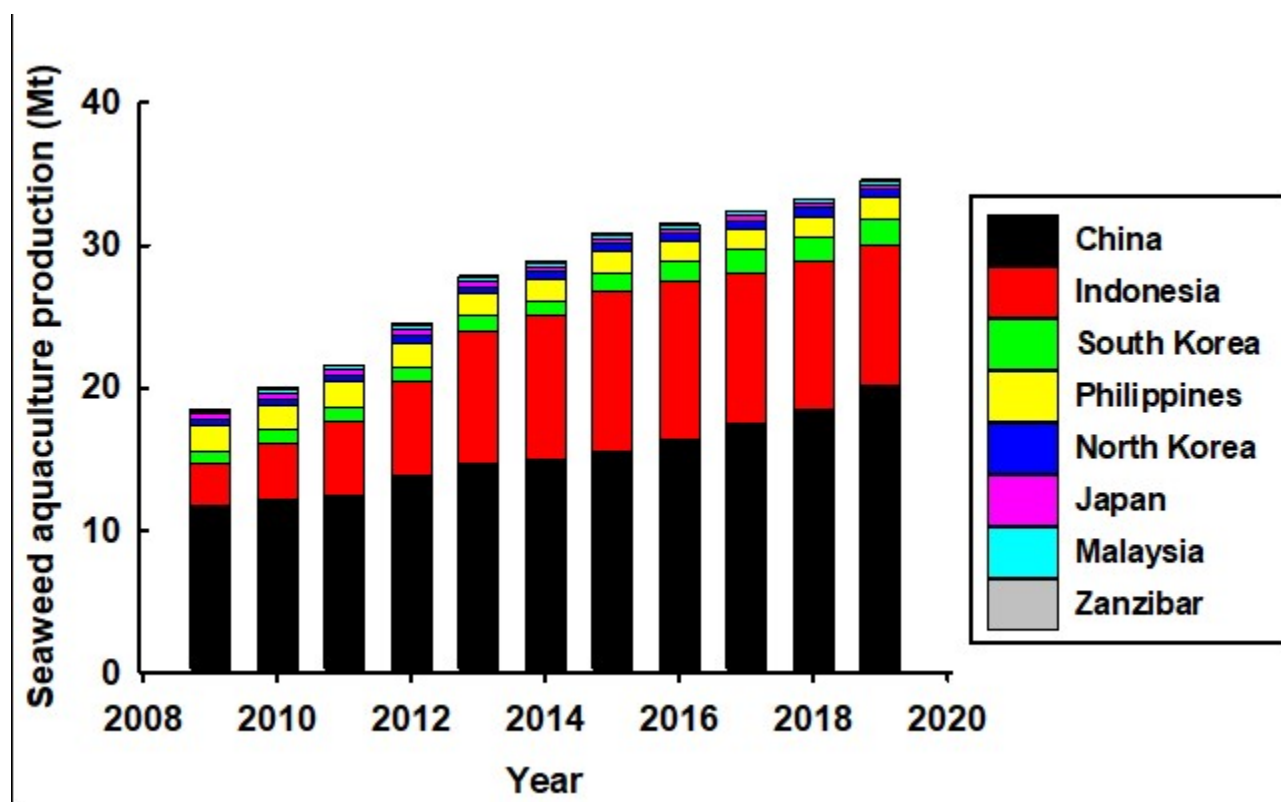


Figure 4. Global seaweed aquaculture production by top producing countries over the past 10 years. "Seaweed" is defined as the taxonomical orders of Chlorophyceae (green seaweed), Phaeophyceae (brown seaweeds) and Rhodophyceae (red seaweeds)

Source: FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.

[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

In 2020, total global seaweed exports were 439,102 tonnes, worth \$546 million (FAO FishStat). This constitutes just over one percent of production and indicates most RDS is consumed or processed in the country of production.

Figure 5 (below) shows seaweed exports by country in 2021<sup>[13]</sup>. Indonesia is responsible for 62 percent of exports, mostly *Eucheuma* to China, Korea, and Vietnam. Chile is also a significant exporter.

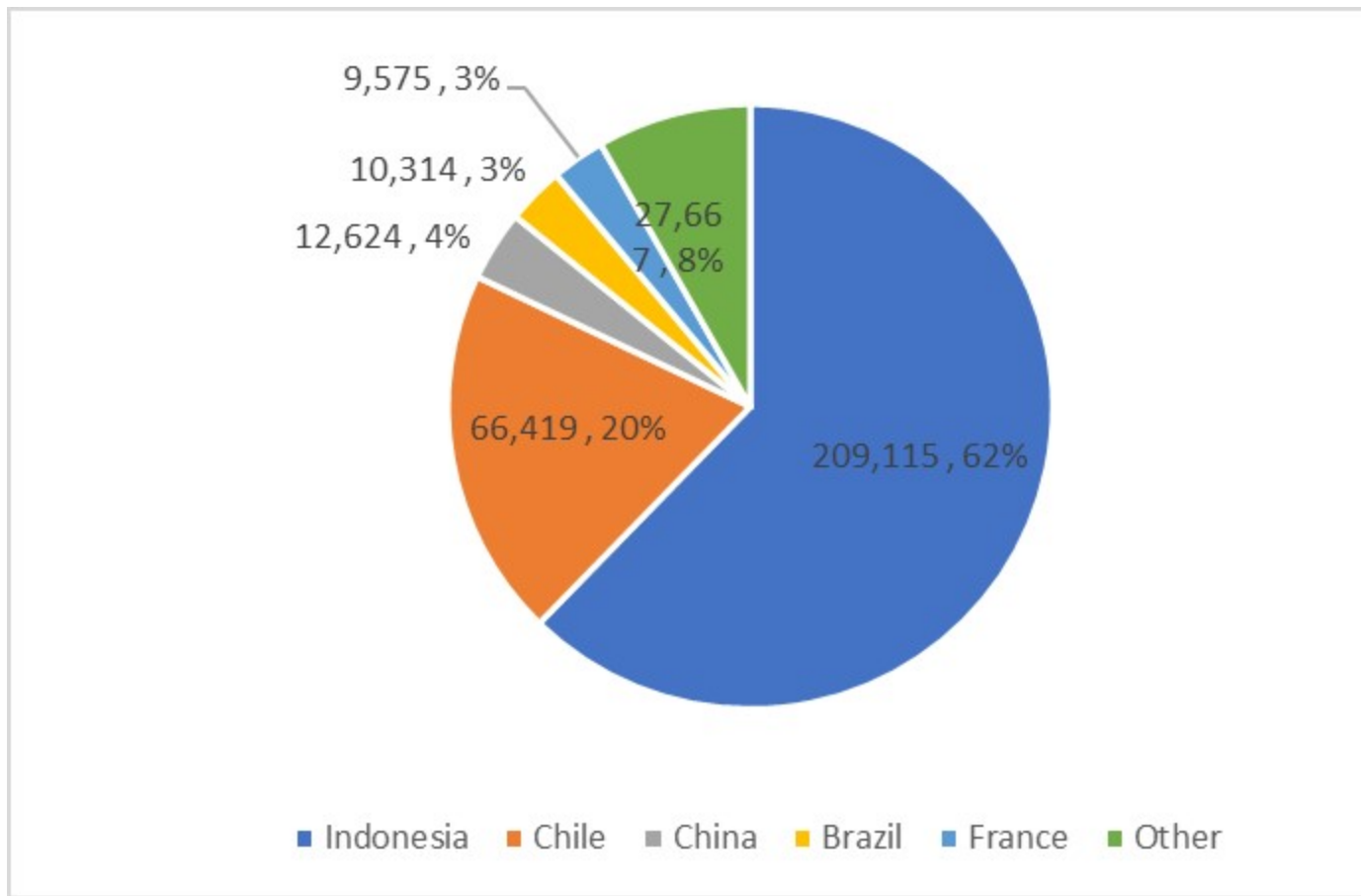


Figure 5: Seaweed Exports by Country in Tonnes (2021)  
Source: UNComtrade



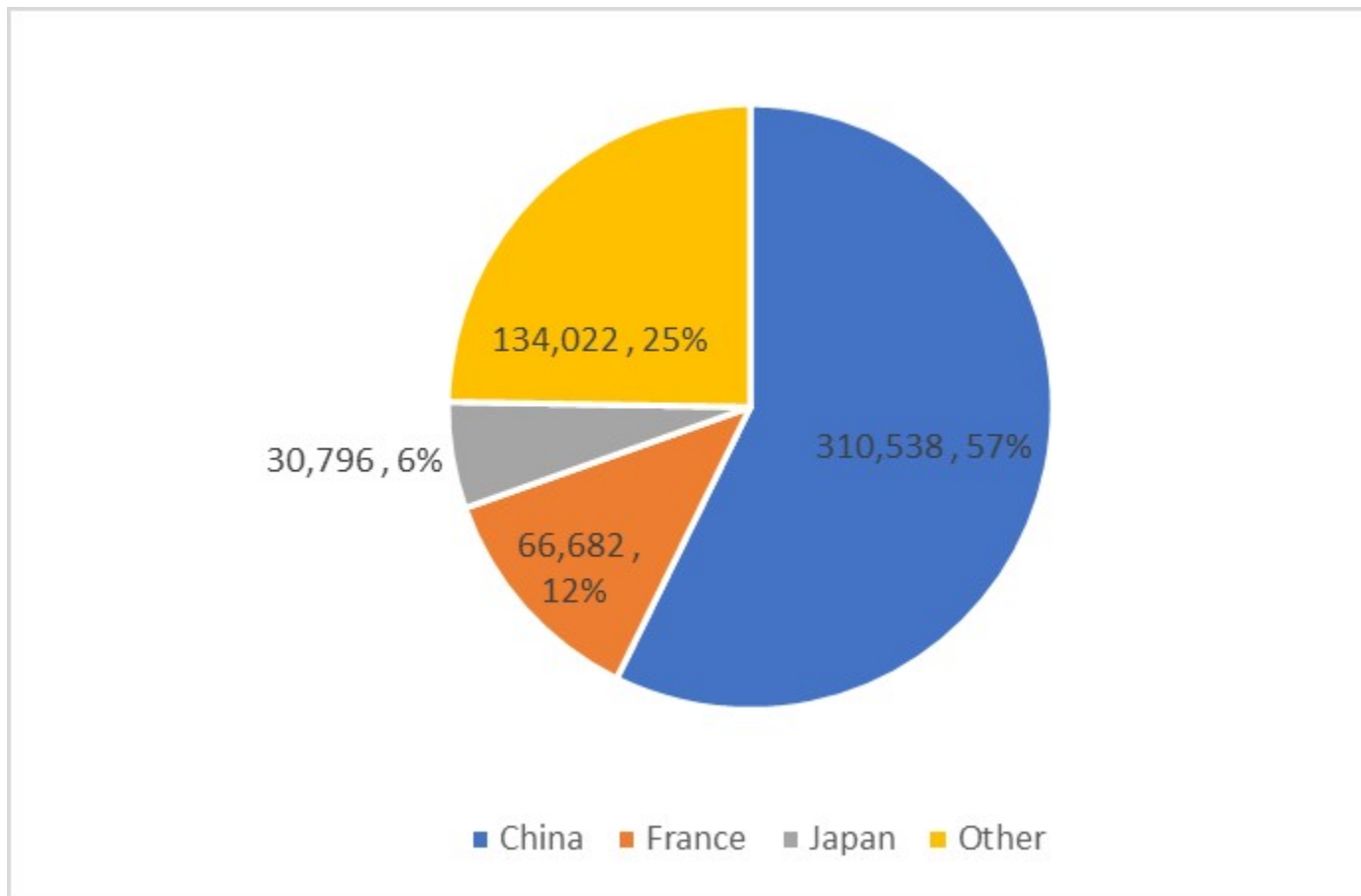
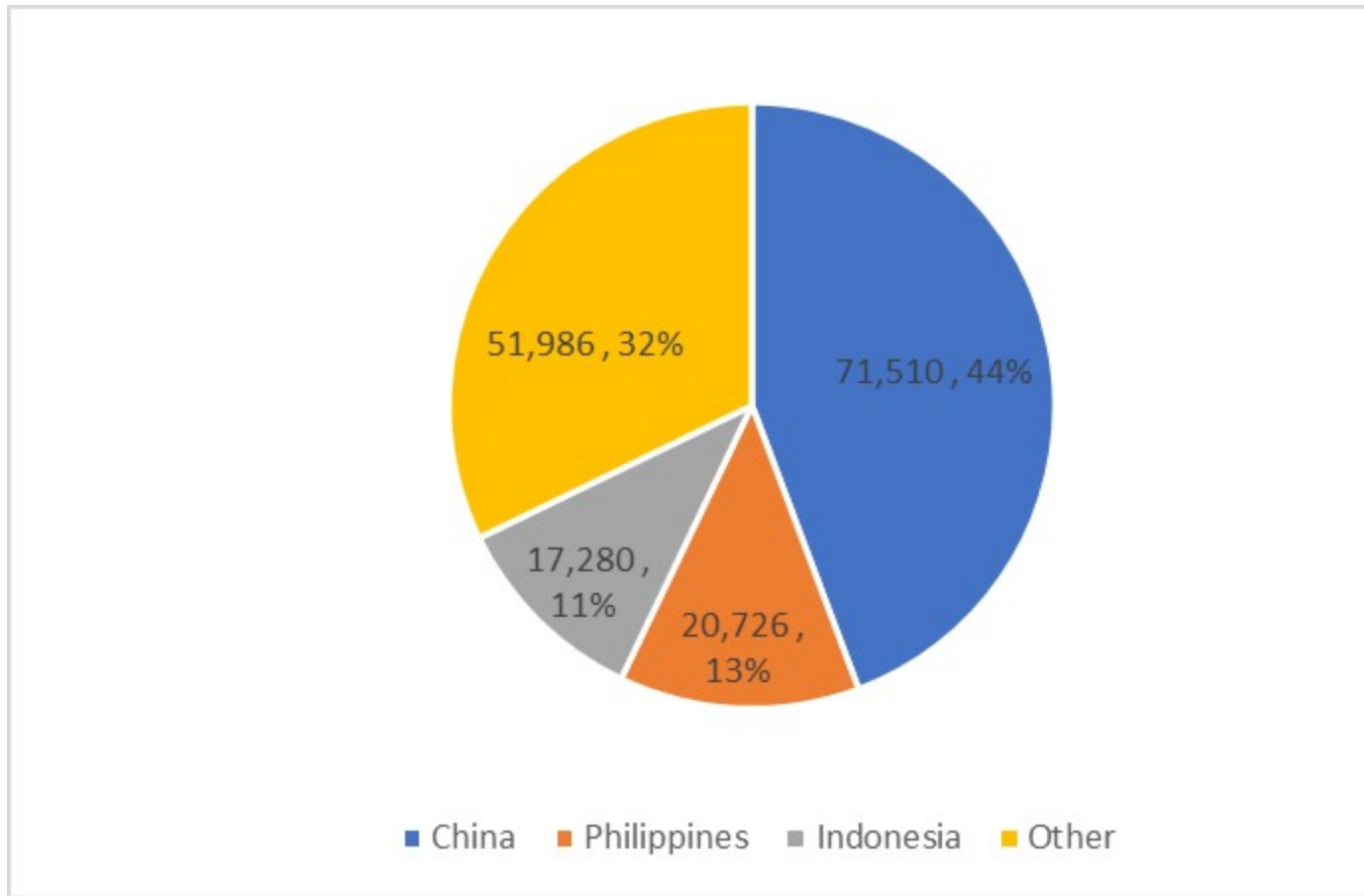


Figure 6: Seaweed Imports by Country in Tonnes (2021)

Source: UNComtrade

The above data indicates most of the international trade in RDS is Indonesia exporting *Eucheuma* to China for processing and China is the main exporter of processed agar agar and carrageenan, mainly to the EU and USA (FAO, 2018)

According to UN Comtrade data (2021), 161,503 tonnes of mucilages and thickeners<sup>[14]</sup> (including agar agar and carrageenan) were exported in 2021. Figure 7 shows China was responsible for 44 percent of global exports of processed seaweed.



*Figure 7: Global Exports of Processed Seaweed in Tonnes (2021)*  
*Source: UN Comtrade*

As an indicator of global price changes over recent years, Figure 8 (below) shows prices for RDS in Banataeng (South Sulawesi, Indonesia) between 2012 and 2022 in Indonesian Rupiah<sup>[15]</sup><sup>15</sup>

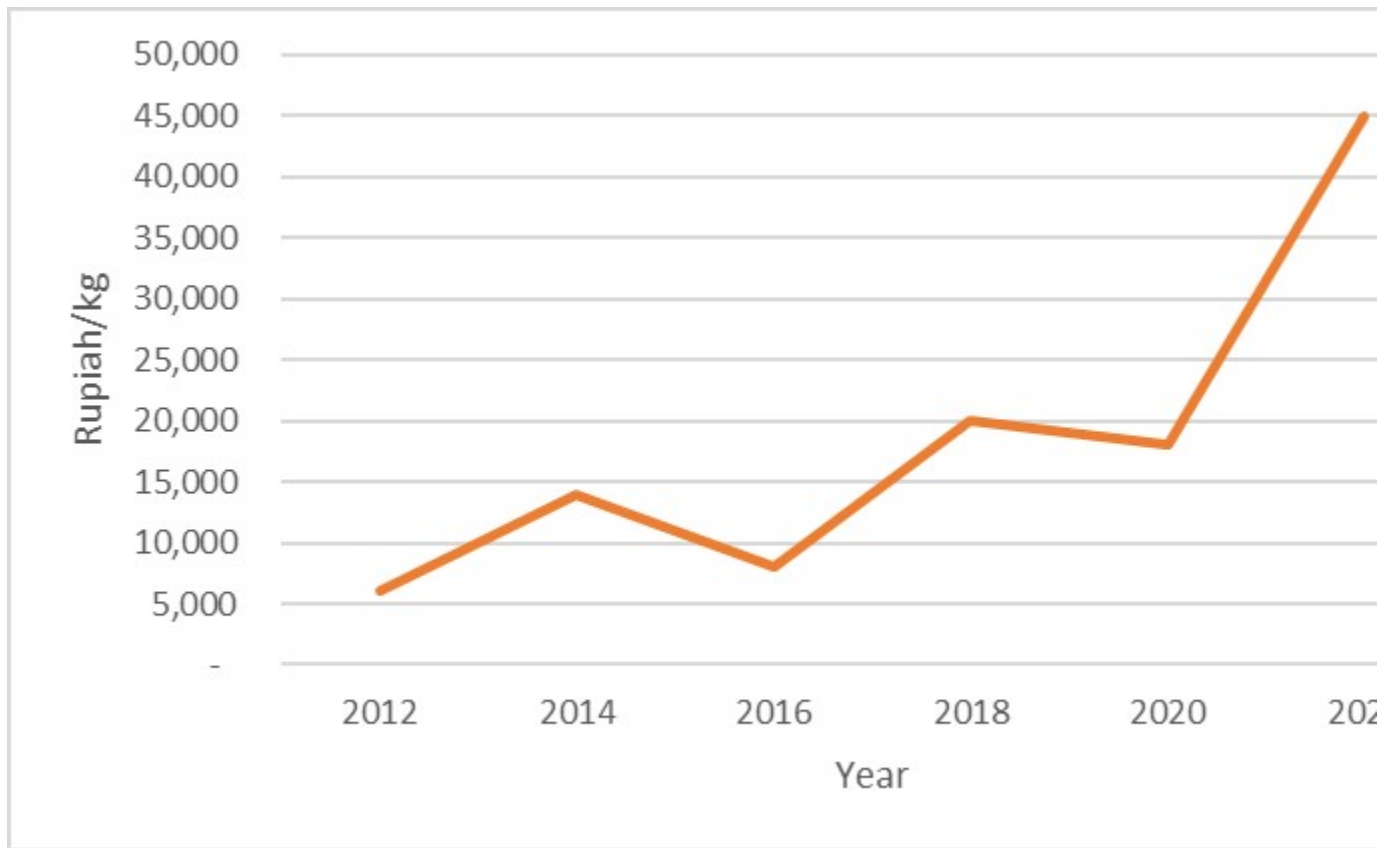


Figure 8: RDS Prices at Banataeng (South Sulawesi)

Source: [www.jasuda.net](http://www.jasuda.net)

In a 2021 analysis<sup>[16]</sup>, it was concluded that there had been three significant developments in the value chain that have affected prices. Firstly, growth in China, the main importer of RDS, slowed from 2015 to 2016, and stocks increased, resulting in prices falling by nearly 50 percent. Secondly, from 2017 to 2018, demand from China increased, and the BLG Chinese company opened a processing facility in South Sulawesi, increasing demand in the region. Thirdly, in 2020 the COVID-19 pandemic significantly disrupted the industry through reduced exports, which greatly reduced demand. Nonetheless, prices have recovered in 2022 and are currently IDR 45,000/kg.<sup>[17]</sup>

There are also seasonal price trends. Prices are lowest in the middle of the dry season when production is highest and prices are highest in the rainy season when production is lowest due to diseases such as ice-ice. The variance can be as much as +/- IDR 15,000/kg.

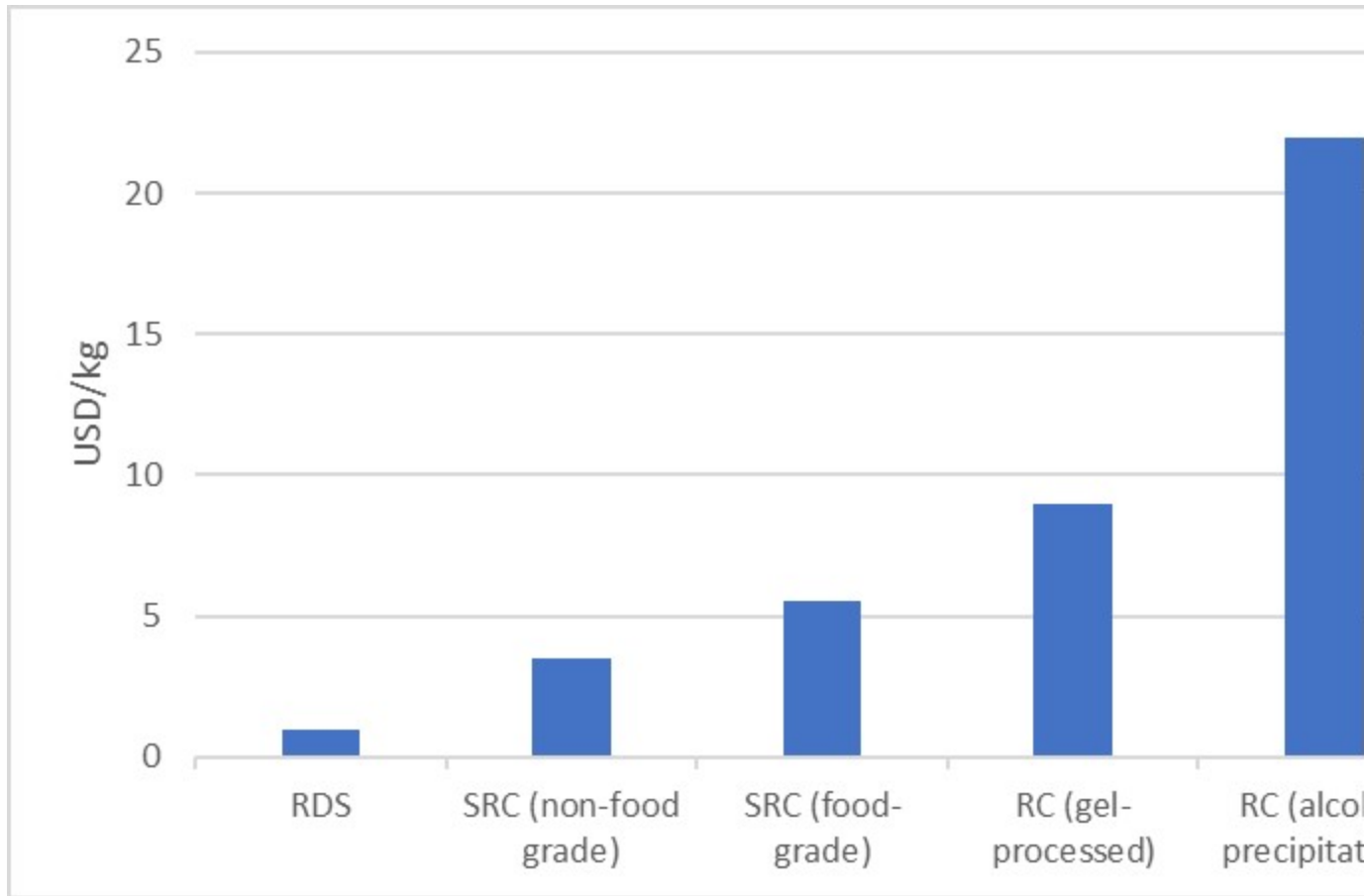


Figure 9: Prices for Processed Carrageenan (shows comparative prices for different carrageenan products based upon a base price of USD 1/kg for RDS)

Source: Nor, A.M., Gray, T.S., Caldwell, G.S. et al. A value chain analysis of Malaysia's seaweed industry. *J Appl Phycol* 32, 2161-2171 (2020). <https://doi.org/10.1007/s10811-019-02004-3>

Although prices increase exponentially with each level of processing, there are also additional costs, and each product has different end markets.

According to Mordor Intelligence, the global demand for carrageenan is projected to grow at an 8 percent Compound Annual Growth Rate between 2022 and 2027. The primary driver is an increasing world population and higher living standards leading to increased demand for processed foods, for which carrageenan is an essential ingredient.<sup>[18]</sup>

Scientific and technological advances are also broadening the uses of carrageenan as food additives and other ingredients such as biofuels, bio-stimulants, and fertilizers. There is also recognition as a provider of ecosystem services such as carbon and nitrogen fixation, oxygen producer, nutrient storage, and absorber of pollutants.

There is a growing demand from the European Union and the United States of America (USA) for carrageenan, but increased attention is also paid to sustainability certification from Marine and Aquaculture Stewardship Councils. The USA National Organics Standards Board voted in 2017 to recommend that the United States Department of Agriculture remove carrageenan from the organic food

additives list, although this was ultimately not approved. Indonesian seaweed farmers and industry groups advocated against this recommendation, with the view that it could significantly affect the industry.

Although the environmental benefits of seaweed cultivation are recognized, the driver for farmers to produce seaweed is income from selling RDS to carrageenan processors in China. Although the demand is increasing and prices have risen over the past ten years, the market is volatile, and there can be short-term falls in demand and prices, which disincentive seaweed farmers. Supply-side constraints include a deteriorating farming environment due to rising seawater temperatures due to climate change, leading to more frequent and severe disease outbreaks. Therefore, increasing the resilience of the seaweed value chain will require diversifying markets for seaweed products and improving ecosystem approaches to seaweed production.

Seaweed aquaculture has seen a surge in new demand fostered by a host of innovations in extract technologies and the recognition that seaweed aquaculture itself has inherent ecosystem benefits such as dissolved oxygen production, acidity reduction and capture of nutrients. The Paris Climate Accord and subsequent national targets make seaweed aquaculture an attractive mechanism for coastal livelihood generation and food produced with environmentally beneficial attributes both at the local scale and for broader climate change mitigation.

***The challenge of aquaculture in the next several decades will be to shift its trajectory towards lower impact products while mitigating the impacts of higher impact products that have higher economic returns.***

At a global level, there is a growing emergence of 'blue food' and 'blue economy' initiatives that seek to provide greater market value sharing and equity in the fishing and aquaculture sectors. The extractive nature of fishing and aquaculture presents threats to natural resource sharing and national and regional controls on the impacts of these activities. Blue foods provide essential nutrition for over 3 billion people and more than 800 million people's livelihoods worldwide. The United Nations Food Systems Summit (UNFSS) is making a case for the integration of Blue Food into the broader food system framework. The integration may be more common at a regional and national level, but silos exist in ministries and agencies addressing concerns that affect coastal communities. The essential nature of food and income makes aquaculture an attractive sector because of its rapid growth and value.

At a regional transboundary level, the project will build on the ISLME. The ISLME is situated at the confluence of the Pacific and Indian Oceans and is bordered by Indonesia and Timor-Leste. It covers an area of 2.13 million km<sup>2</sup>, with 98% within Indonesia's territorial waters, and approximately 2% in Timor-Leste's territorial waters. Within the ISLME, 1.49% of the area is officially protected, containing 10.82% and 0.76% of the world's coral reefs and seamounts, respectively. The value of the ISLME from an environmental perspective is threatened by human activities including IUU fishing, overfishing, destructive fishing, anthropogenic pollution, a warming temperature, and increased diffusion of carbon dioxide from the air into the ocean causing increased acidity that erodes the carbonaceous bedrock of ocean ecosystems.

Below is an elaboration of institutions and areas of overlap and synergy where engagement will be critical for success:

- The Seafood Task Force (STF) is a private sector, a member-based trade association dedicated to providing supply chain confidence to brand members, oversight to supply chain owners and means for the international markets to engage with national governments to institute interventions that increase the confidence to trade with suppliers globally.

- Fish Forward is an EU-co-funded project that raises awareness of sustainable seafood consumption. Fish Forward aims to achieve behavior change in consumers and corporations in Europe based on increased

awareness and knowledge of the implications of seafood consumption and sourcing on people and oceans in developing countries, but also in Europe.

- The Conservation Markets Initiative is a large-scale Gordon and Betty Moore Foundation-funded project to eliminate the conversion of natural habitats and overfishing from global supply chains through market-based commitments to conversion-free and overfishing-free commodities. The USA, EU, and Japan are the targeted demand-side markets for this work, and farmed shrimp as well as feeds are focal priorities for this initiative.

- The Blue Food Assessment (BFA) is an international joint initiative that has brought together over 100 scientists from more than 25 institutions. The Stockholm Resilience Centre and Stanford University are the lead science partners and EAT is the lead impact partner. This interdisciplinary team supports decision-makers in evaluating trade-offs and implementing solutions to build healthy, equitable, and sustainable food systems.

- The Aquaculture Working Group of the World Economic Forum's Blue Food Partnership was launched in September 2021 and will begin developing aquaculture-related targets to set a stronger sustainability trajectory for global aquaculture.

- The Coral Triangle Center (CTC) supports on-the-ground conservation in Nusa Penida in Bali, Banda Islands in Maluku, as well as Atauro Island and Liquica in Timor-Leste. CTC is a certified training center of the Government of Indonesia and a Development Partner for the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security.

- WWF, Southeast Asian Fisheries Development Center (SEAFDEC), The Philippines Bureau of Fisheries and Aquatic Resources (BFAR), and Viet Nam's Ministry of Agriculture and Rural Development have had a PIF approved and currently are in the process of developing the full proposal to generate new approaches to seaweed aquaculture in non-nearshore areas with a focus on facilitating better market equity and payments for ecosystem services.

- International Finance Corporation (IFC) is developing a global market study of seaweed and seaweed-related products to better inform investors interested in engaging in seaweed and related value chains. The intent is to determine the majority of potential uses for seaweed and seaweed extracts to stimulate market demand and increase seaweed aquaculture production, globally.

- US Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E) has invested \$40 million into seaweed aquaculture research as potential biofuels and has developed site selection software that supports proper investment locations for optimizing seaweed growth. ARPA-E has also developed seaweed cultivation and harvest equipment methods. Several demo projects are ongoing in collaboration with private sector entities. During the PPG phase, this project will coordinate with ARPA-E and its partners to identify technology applications suitable for a Southeast Asian context.

- Lloyds Register Foundation is funding seaweed product testing for chemical identification as well as a Coalition for Safe Seaweed Production. They are also working to establish an International Roundtable on Sustainable Seaweed that convenes key stakeholders around global safety standards.

- WWF has developed an impact investing facility that is making equity investments into seaweed farms and seaweed-related products such as bio-based packaging materials.

- Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) has a partnership that spans 11 countries in South East and East Asia and 21 non-country partners for sustainable development of the seas, and ocean and coastal governance. The Sustainable Development Strategy for Seas of East Asia (SDS-SEA) was adopted in December 2003 and incorporates relevant international conventions, existing regional and international action programs, agreements, and instruments, as well as applicable principles and implementation approaches for achieving sustainable development of the Seas of East Asia. Updated in 2015, the SDS-SEA provides a framework for policy and program development and

implementation at the regional, national, and local levels for achieving the goals and targets set by these various global instruments. The SDS-SEA also provides a platform for cooperation among PEMSEA partners and collaborators, as well as other stakeholders. PEMSEA is active in both the project countries.







ADB Action Plan for Healthy Oceans and Sustainable Blue Economies. ADB has committed to leverage up to \$5 billion in investments by 2024 and is encouraging investments in several flagship programs - pollution prevention and management (including plastics), building integrated coastal resilience, and a blue economy (including fisheries and aquaculture, tourism, marine renewables).

Numerous seaweed livelihood projects have been attempted around the world by development and aid organizations with varying degrees of success due to the complexity and length of the market chain and the various products that can be produced through the chemical extraction of seaweed.

### ***Indonesia baseline scenario and associated baseline project***

Indonesia is the second largest shrimp-producing nation, only behind China (Fig. 2). Indonesia's shrimp production is a mixture of traditional (*tambak*) shrimp farming, semi-intensive, intensive, and super-intensive shrimp farming. The dominant species of production are whiteleg shrimp (*Litopenaeus vannamei*), expected to grow 10% p.a. ('17-'22); black tiger shrimp (*Penaeus monodon*). Whiteleg shrimp represents 71% of Indonesia's shrimp farming, while tiger shrimp represent less than 29% of production. The former is expected to increase in volume by 29% per annum, while the latter is only expected to increase by 2% per annum. Traditional tambak farming uses the native species ? tiger shrimp ? in low-intensity coastal ponds that tend to be located in the intertidal zone. The small-holder nature of extensive shrimp farming focuses on reducing capital expenditures; thus, large ponds with low stocking density are fed by the tidal prism, which flushes water in and out of tambaks. Introducing whiteleg shrimp as an alternative species to culture came with clear competitive guidance ? making money in whiteleg shrimp aquaculture means intensification and greater capital expenditures. Larger farm investments came with this approach, but there was also a movement from traditional tambak farmers to transition their farms to more intensive systems. Unfortunately, the high capital expenditures forced shortcuts, and sub-optimal equipment, seed, feed, and chemicals became the norm. This forced farmers to operate at the margins. Further, knowledge of better practices, the benefits of high-quality seed, what is truly in feed, and the ill-advised attempts to maintain disease with antibiotics and pesticide use became a dependency.

The information and the sale of feed and purchasing of shrimp are conducted by middlemen that tend to maximize profit over the greater success of farmers. Middlemen control the information provided to farmers and the information from farmers to processing facilities. Because of this, the farmed shrimp supply chain and costs resemble the depiction in Figure 5. A depiction of the feed and feed ingredients supply chain is not possible because in many instances the feed companies do not know the origins of the ingredients they source to make shrimp feed.

							
		Feed	Hatchery	Farming Nursery > Grow-out	Logistics/ Middlemen	Processing	Local market Export
L. Vannamei	Costs	\$0.84/kg feed	\$2,680/M PL	\$3.17/KG			\$8.49/KG
	Price	\$0.90/kg Feed	\$3,190/M PL	\$3.75/kg			\$8.89/KG
	EBIT margins	-7%	-16%	-16%	-2-7 %		-5%
P. Monodon	Cost	\$0.84/kg Feed	\$1,400/M PL	\$3.50/kg			\$11.88/kg
	Price	\$0.90/kg Feed	\$1,700/M PL	\$5.20/kg			\$13.00/kg
	EBIT margins	-7%	-18%	-3.3%	-5-12%		-9%

Key assumptions:

- L. Vannamei costs based on large-scale players
- L. Vannamei prices based on average shrimp size (-60 pcs/kg)
- P. Monodon costs based on small-scale players (except feed)
- P. Monodon prices based on average shrimp size
- Margins include consideration such as survival otherwise indicated

Figure 10. Overview of costs, sales price, and EBIT margin across value chain  
Source: Boston Consulting Group

The ISLME is under pressure from IUU fishing, including significant transboundary fishing which the MMAF estimates to be a \$20 billion per year loss.<sup>[19]19</sup> Fishmeal production in Indonesia is showing an erratic if not declining trend while the production of aquaculture (excluding aquatic plants and molluscs) is growing rapidly (Fig. 11). Fishmeal is a somewhat ambiguous term because it includes any fishery used for the product. The fish meal renderers and possibly the feed manufacturers are aware of what fisheries are used. Thus, the true composition of fisheries used for fishmeal is masked. Moreover, the forced and bonded labour reports from Thailand have peeled back some of the opaqueness of Asian feed supply chains, but producers, processors, and retailers are increasingly concerned about the need for greater sustainability in aquaculture feed production and are requiring certification or evidence of continuous improvement from fishmeal and fish oil (FMFO) providers. The international market's reactions to challenges in supply chains tends toward more auditing and more certification. Recognizing that traceability does not exist, and certification can only function with traceability, it will only be other forces ? market actors, governments or pre-competitive platforms that can change these supply chains for the better.



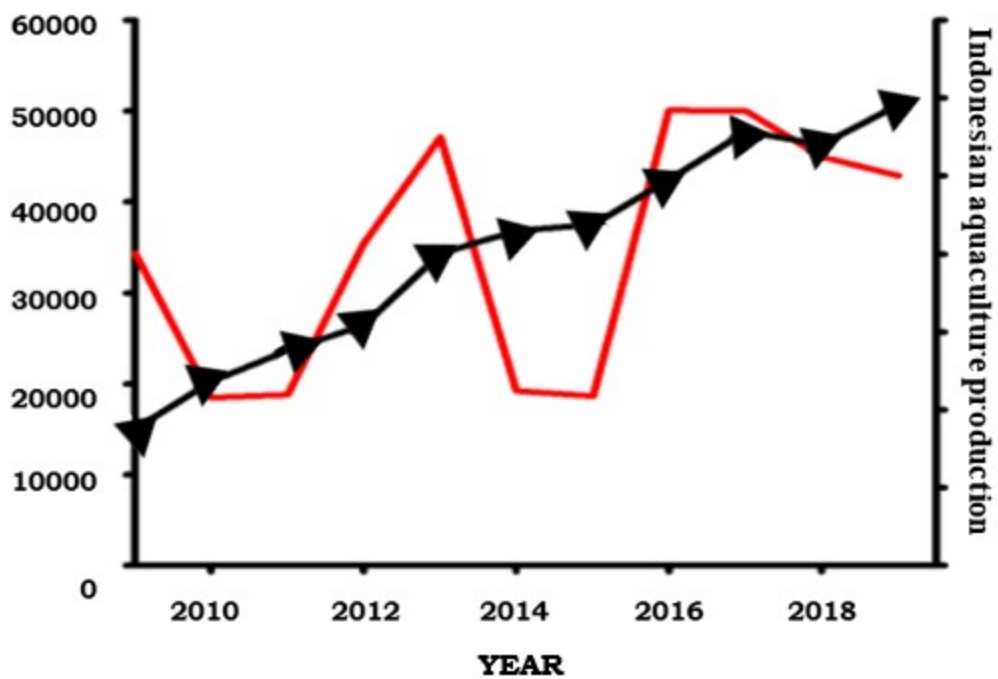


Figure 11. Fishmeal and aquaculture production in Indonesia (\*Excludes aquatic plants and molluscs)

Source: FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.  
[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)



Figure 12: Map showing ADB Loan project sites and focal sites for Outcome 2.1 (Jawa Barat, Jawa Timur, Lampung and Kalimantan Selatan) Source: KKP

The two most current pieces of Indonesian legislation on aquaculture feed are (1) 55/PERMEN-KP/2018 and (2) *Cara Pembuatan Pakan Ikan yang Baik* (CPPIB, Good Fish Feed Manufacturing Practices) part of IndoGAP regulation number 14/2019/National Standardization Agency. There are no specific regulations on traceability or digital platforms for feed but there are label requirements including production code, feed ingredient origin, certificate of origin (COO), and certificate of authenticity (COA) for imported feed ingredients as a part of feed registration and certificate under the CPPIB standard. There are no regulations on FMFO sourcing but currently, MMAF has been developing local fishmeal certification work together with Sustainable Fisheries Partnership (SFP) and MarinTrust for certification to comply with international market requirements. Local fishmeal raw material comes primarily from by-product fisheries, ?trash? fish, and other bycatch species such as ?lemuru? fish (Bali *Sardinella*).

The USA is the largest buyer of Indonesian shrimp, accounting for over 70% of the country?s shrimp export in 2020. In 2018, the US required importers and exporters to have additional traceability records

for the Seafood Import Monitoring Program (SIMP) to prevent IUU Fishing and Seafood Fraud, and protect global food security and sustainability. The policy took effect on December 31, 2018, pushing the industry to develop traceability records from the finished product to the farm. Most retailers in the US and EU currently source shrimp products from BAP or Aquaculture Stewardship Council (ASC)-certified suppliers.

### *Timor-Leste baseline scenario and associated baseline projects*

Timor-Leste has made significant progress since the end of 25 years of conflict in 1999, but recent developments highlight the continuing challenges in attaining economic self-reliance. The gross domestic product (GDP) growth averaged 3.3% during 2010-2019 mainly due to its petroleum wealth, and the economy remains largely driven by public spending and consumption expenditure. The country avoided high rates of coronavirus disease (COVID-19) infection, but its 2020 GDP contracted by 7.9%, compared to pre-COVID-19 forecasts of 4.6% to 5.4% growth, due to constrained public spending and reduced private consumption. Re-establishing growth after the impacts of the pandemic remains challenging. The government adopted the Economic Recovery Plan in August 2020 to respond to the impacts of COVID-19 and make the economy and society more resilient to future shocks. Agriculture, including the small agri-food industry, is a priority area.

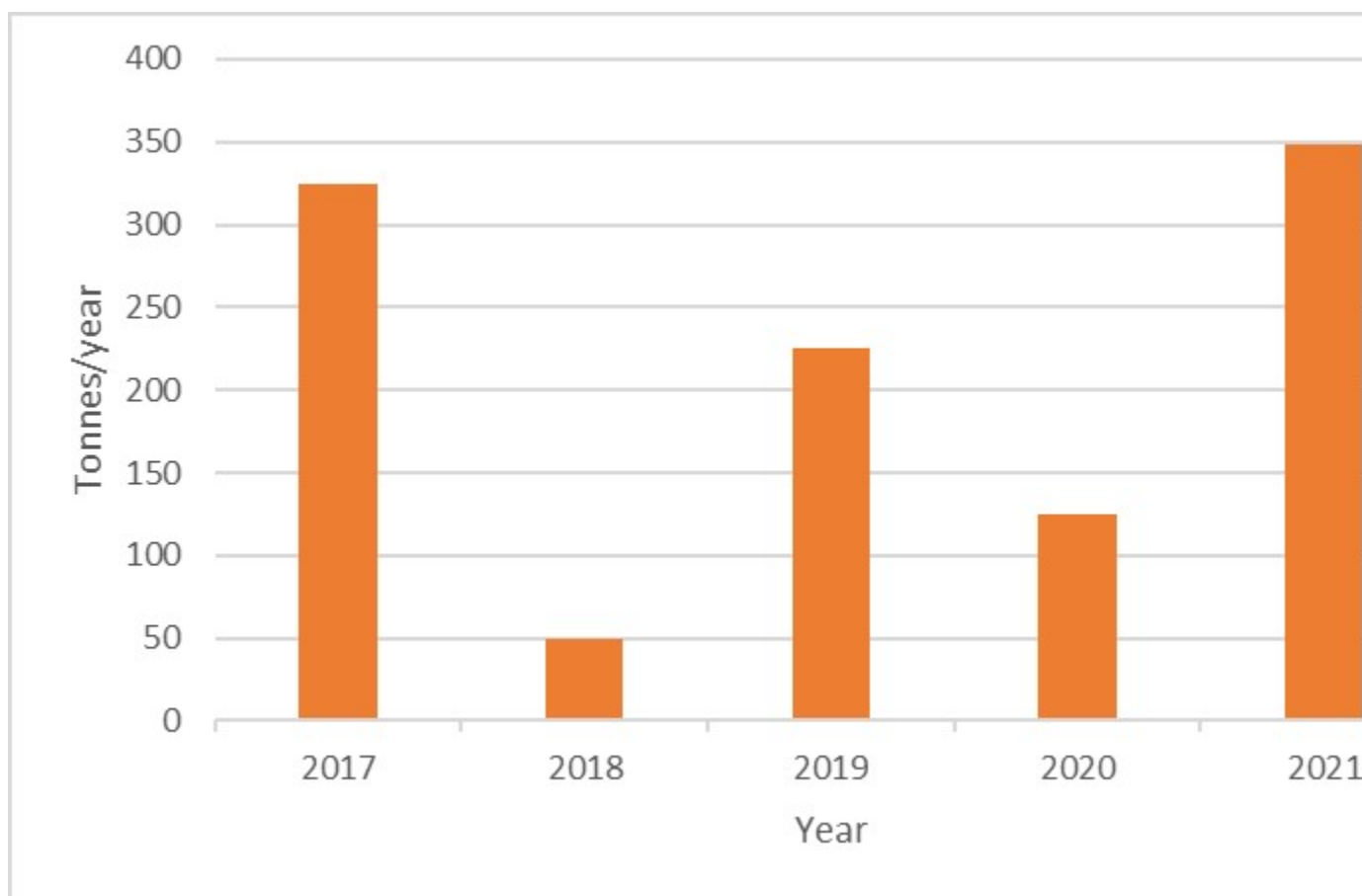
A number of development partner agencies have advanced work on aquaculture in Timor-Leste, including USAID, WorldFish, and FAO. The industry is in the nascent stages of development, and as such it will be important to build on work done to date and align with the strategic priorities of the country. and the Indonesian Seas Large Marine Ecosystem (ISLME) projects. FAO is conducting a scoping study in northern Timor-Leste under ISLME and will support some interesting pilot investments. ADB is also processing a loan + grant for Timor-Leste ? ?Water Harvesting and Agriculture Improvement Project?.

The Timor-Leste National Aquaculture Development Strategy 2012-2030: i) identifies challenges to achieving food security and nutrition goals, ii) outlines a framework, strategy, and some key guiding principles, iii) presents a 9-point action plan, and iv) confirms that implementation will be led by the National Directorate of Fisheries and Aquaculture (NDFA), in coordination with a range of other development partners. Action priorities include:

- a. Identification of suitable agroecological zones for aquaculture development completed
- b. Viable aquaculture technologies developed and disseminated
- c. Institutional capacity of the NDFA strengthened
- d. Sustainable input supply systems established
- e. Aquaculture producers connected to markets
- f. Household food and nutrition security improved by aquaculture
- g. Effective partnerships between government agencies, NGOs, communities, the private sector, and donors created
- h. Aquaculture farmer groups and representative institutions empowered, and
- i. Favourable policies in place for environmentally responsible aquaculture development.

One of the targets of the National Aquaculture Development Strategy is promoting seaweed aquaculture. The National Aquaculture Development Strategy states, ?Promotion of seaweed farming to become a more viable enterprise and benefits extended to a greater number of poor fishers?. The activities listed under this objective are: i) Zoning and carrying capacity studies define sustainable producer limits within areas, ii) Management and technology improvements identified for seaweed farming areas disseminated, iii) Improvements made in post-harvest handling of seaweed through participatory trials (drying, storing, packaging), and iv) techniques disseminated.

**Seaweed production in Timor-Leste:** Figure 13 shows the production of RDS in Timor-Leste over the past five years, which varies considerably between fifty tonnes/year in 2018 and 349 tonnes/year in 2021 but this high still represented just 0.001 percent of global production in 2021.



*Figure 13: Seaweed Production in Timor-Leste*  
*Source: Estimates based on interviews*

Nearly all production takes place on Atauro Island, located 20 nautical miles north of Dili in the Wetar Strait. NDFA estimates current production areas cover 63ha on Atauro Island, mostly off the east coast of Biqueli, 5ha in Ulmera (Bazartete, Liqui? a municipality), 0.5ha in Manuleu (Sabuli, Metinaro municipality) and 1.5ha in Biacou (Aidabalaten, Atabae, Bobonaro municipality). The potential area for seaweed production across all municipalities is estimated at 266ha.

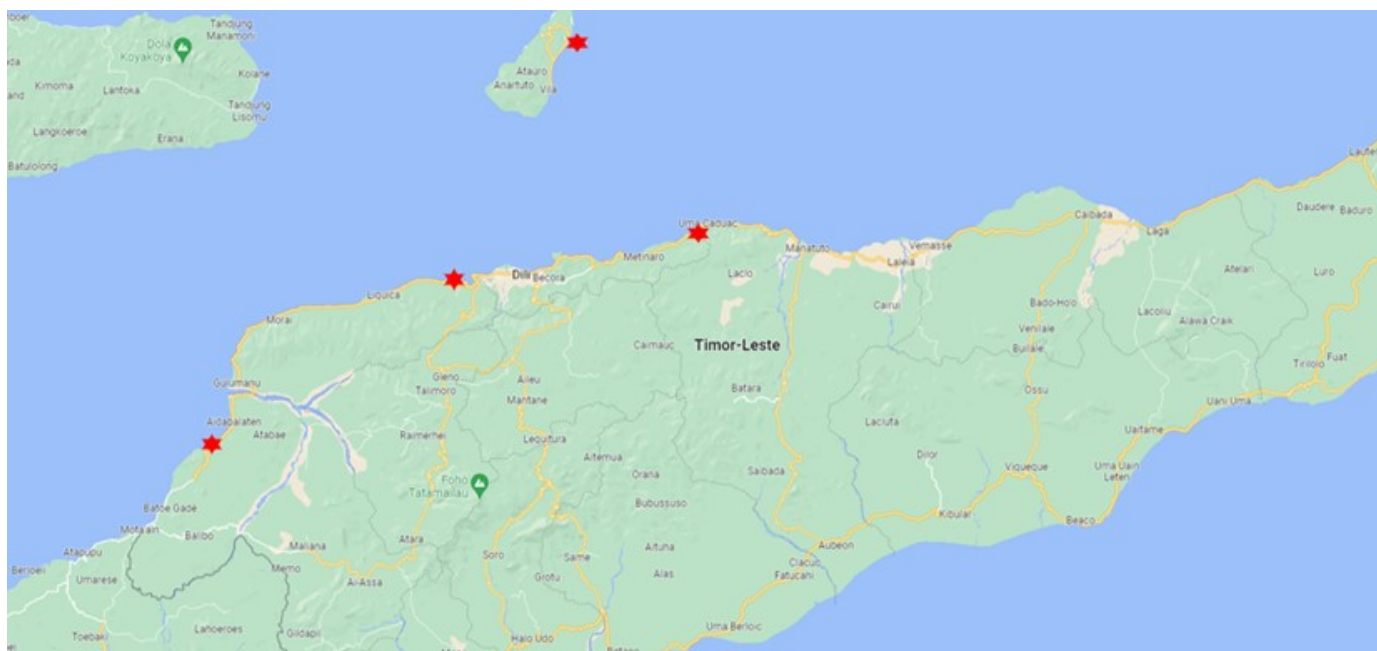


Figure 14: Map of Main Seaweed Cultivation Sites  
Source: Google Maps

Aldeia/Municipality	Latitude	Longitude
Biqueli, Atauro	-8.18065	125.63386
Ulmera, Liquiçá	-8.57256	125.45226
Manuleu, Metinaro	-8.49003	125.82426
Biacou, Bobonaro	-8.83049	125.05507

Atauro is particularly suited for seaweed cultivation as there is little pollution due to its isolated location and experiences little run-off during the rainy season, compared to mainland Timor-Leste.

According to Neish (2019), the main cultivar of seaweed produced in Atauro is Sacol (*Kappaphycus striatus*) which replaced much of the Cottonii (*Kappaphycus cottonii*) in about 2008 as it was found to grow better and suffered less from 'ice-ice'. Both Sacol and Cottonii produce 'kappa' carrageenan. Prior to that, Spinosum (*Eucheuma spinosum*) was also cultivated which produces 'iota' carrageenan. The cultivars were originally introduced from the neighboring Indonesian islands of Alor and Wetar.

**Seaweed farming methods in Timor-Leste:** The number of seaweed farmers in Timor-Leste varies as they are sensitive to prices and due to the relatively short production cycle, stop cultivation if prices fall

below a certain level (See break-even analysis below). Estimates vary between 261 households (Guterres & Marques, 2021) and 645 households (NDFA, 2012). Seaweed production is mostly a part-time activity and producers also carry out other income generating activities such as fishing and terrestrial farming.

Seaweed farmers cultivate seaweed using the 'off-bottom' and 'floating-line' method, with the former being the most popular in shallow waters. Farmers interviewed cultivated 100 lines which are about 25 metres long and harvested about 300 kg of RDS every month. At the current farm-gate price of \$2.00/kg, this represents a monthly income of \$600. However, these were the larger seaweed farmers and the average household scale of production is likely to be much less than this. Table 1 provides a gross margin for a 1ha seaweed farm for one year, using the off-bottom method, which does not require a canoe. Most seaweed farmers produce their own seedlings, make their own planting sticks and bamboo drying racks, and rely on family labour at no cash cost. However, costs for these items have been included in the gross margin analysis. The main cash cost is the ropes to tie the seaweed.

Table 1: Gross Margin for Seaweed Farming (1ha for one year)  
Source: Estimate based on farmer interviews during PPG

Item	USD
<u>Income</u>	
10,000kg RDS @ \$2/kg	20,000.00
<u>Expenditure</u>	
10,000kg seedlings (@ opportunity cost of lost RDS)	2,857.14
Rope	1,675
Drying rack (depreciated)	266.67
Labour: 342 days @ \$5.23/day	<u>1,788.66</u>
<i>Sub-total</i>	<i>6,587.47</i>
<b>Gross margin</b>	<b>13,412.53</b>

### Assumptions

- ? An individual farmer will carry out seven cycles of seaweed production a year
- ? Rope costs: 20,000m of 6mm rope = \$1,300 plus 15,000m of 3mm rope (ties) = \$375 (replaced after one year)
- ? Conversion of fresh wet seaweed weight to RDS = 7:1
- ? Seedling weight = 100g each tied every 20cm
- ? Labour required: Erecting posts 5 man-days, Tying and harvesting 22 man-days, maintenance 315 days. Total = 342 man-days
- ? Timor-Leste minimum wage = \$115/month/22 days = \$5.23/day
- ? Bamboo drying racks. Depreciation: Cost \$800. Life-span = three years.  $\$800 / 3 = \$266.67/\text{year}$

At the current high price of \$2/kg for RDS, one hectare produces an annual gross margin of \$13,412.53, which is a return on investment of 204 percent. Based on the above costs, the break-even price for RDS is \$0.66/kg.

Seaweed farmers interviewed stated 'ice-ice' was the biggest threat to yields, rather than other hazards such as grazing by sea urchins or fish.

**Post-harvest handling:** Fresh wet seaweed is harvested at about 45 days and is spread on a tarpaulin on the ground or on nets on bamboo tables for drying under the sun which can take two or three days. The optimum moisture content is 38 percent. However, farmers can under-dry the seaweed to achieve a higher weight with the expectation of receiving more income. Accounting for this, buyers offer a lower price as they have to carry out further drying at their warehouses.

Contamination with sand/dirt is also an issue if the seaweed is dried on the ground. Moisture content and cleanliness are the two main determinants of quality, which could be improved.

**Seaweed farmer organization:** Farmers cultivate seaweed individually but may market their RDS through cooperatives. In Atauro there are two cooperatives - Cottonii and BEATA. The Cottonii cooperative has a membership of 186 households but has also bought from up to 70 non-member households. There is no subscription fee and the benefit of membership is the award of dividends although none have been distributed to date. Seaweed farmers dry and bale their RDS, then take it to one of the six buying stations on Atauro operated by Cottonii. Cottonii weighs the bales and then transports the RDS to a central warehouse where the bales are stored until collection by buyers from Indonesia.

The cooperative carries out the important roles of aggregation, storage, and market linkage to buyers in Indonesia, for which they charge a five percent commission. Without such an organization, the seaweed

sector would not be viable, as overseas importers are not interested in carrying out these functions. Indonesian buyers then sell the RDS on to carrageenan processors in Indonesia or third-party countries.

**Seaweed trade in Timor-Leste:** The end market for RDS from Timor-Leste is carrageenan. Nearly all of the seaweed production is from Atauro and exported to countries in the region such as Indonesia, Vietnam, China, Korea, and the Philippines where it is re-exported as RDS to processing countries such as China or processed into carrageenan and re-exported to countries, such as EU and USA, to be used as an ingredient in other manufactured products.

There are four main aggregators/exporters in Timor-Leste. Cottonii and FILNA are based on Atauro and Fortuna Star and Best Seafood are based in Dili. There are two export routes. The Cottonii cooperative accumulates RDS over a six month period and coordinates with buyers in Sulawesi who pick up the RDS on Atauro with their own boat. Other aggregators export RDS in containers from Dili port which incurs additional charges of transporting the RDS from Atauro to Dili.

When Timor-Leste was part of Indonesia (prior to independence), some traders had buy-back agreements with seaweed farmers, whereby the traders provide ropes and cash to the farmers in advance, with an understanding the farmers sell their seaweed to that trader.

**Regulatory framework:** Seaweed farmers are required to have a license issued by NDFA. Although the license is free it doesn't provide a production amount or location, so cannot be used as a tool for land-use planning or monitoring carrying capacity.

Marine Protected Areas (MPA) have been established in several locations. The MPAs on Atauro categorize areas into three zones. 1 ? No activities, 2 ? fishing and recreation, and 3 ? fishing, recreation, and seaweed. *Tara Bandu* has been used as a means of conflict management when implementing MPAs.

Exporters must be a registered companies and have an Export License. To export seaweed, the company must receive a letter of recommendation (phytosanitary certificate) from the National Directorate of Fisheries and Aquaculture (NDFA), a Certificate of Origin from the Ministry of Trade, Commerce and Industry and a Customs Declaration prepared by a Customs Broker. Finally, the shipment undergoes an inspection by the Customs Authority.

### **Socio-cultural:**

Gender: Labour for seaweed cultivation is mostly carried out by women, for example tying seedlings and cleaning the lines. Men usually help out with the heavier tasks of carrying the freshly harvested seaweed to shore. If the seaweed beds are close to the homestead, seaweed cultivation does not significantly affect traditional household duties. However, women do not usually paddle canoes, therefore cultivation is limited to the inshore off-bottom cultivation methods

Conflict management: According to Guterres & Marques (2021), a previous seaweed project in Biacou had to be abandoned due to conflict between seaweed farmers and the local community. This can happen due to conflicting land use between fishers and seaweed farmers if fishers are unable to land their boats due to the seaweed beds. Conflict can also arise if the farmers cultivating the seaweed are not from the area, and are seen to be stealing resources from the local community.

Theft can also occur if the seaweed farmers do not live close to the seaweed beds and have led to some seaweed farmers constructing temporary shelters on the beach to live in during production cycles. This also has gender implications, as women are less likely to want to stay away from home.

*Tara bandu* is a traditional Timorese custom that enforces peace and reconciliation through the power of public agreement. According to Belun (2013) *Tara bandu* can be classified broadly into three categories: *tara bandu* regulating people-to-people relations; *tara bandu* regulating people-to-animal relations; and,



*tara bandu* regulating people's relationships with the environment. Punishment for breaking the conditions of a *tara bandu* can take the form of fines in the form of livestock or cash payments. Examples of *tara bandu* regulating people's relationship with the environment include regulating the time for harvest or fishing according to climatic shifts, preventing overfishing, and ensuring equal benefit to all community members.

Table 2: Strengths, Weaknesses, Opportunities, and Threats of the Seaweed Value Chain

<p style="text-align: center;"><u>Strengths</u></p> <ul style="list-style-type: none"> <li>a. There are additional suitable areas to establish seaweed production e.g. Metinaro</li> <li>b. There are techniques to expand production in existing areas e.g. floating rafts.</li> <li>c. Seaweed export procedures are well established to facilitate trade</li> <li>d. Seaweed farming does not require high investment or operating costs so is easily adopted</li> <li>e. Seaweed farming is suitable for women</li> <li>f. Cooperatives such as Cottonii already exist to organize farmers for market linkage</li> <li>g. MPAs have already been established to facilitate land-use planning and reduce conflict among users.</li> </ul>	<p style="text-align: center;"><u>Weaknesses</u></p> <ul style="list-style-type: none"> <li>a. Small volumes of production don't attract many buyers</li> <li>b. Diseases such as ice-ice due to inadequate management</li> <li>c. Seedstock is now very old</li> <li>d. Quality of RDS can be low due to poor drying (moisture content and contamination)</li> <li>e. Timor-Leste seaweed farmers receive a third less than Sulawesi farmers due to additional transport costs</li> </ul>
<p style="text-align: center;"><u>Opportunities</u></p> <ul style="list-style-type: none"> <li>a. Seek new buyers for new end markets e.g. bio-stimulants</li> <li>b. Access additional markets due to proximity to large Indonesian seaweed supply chain</li> <li>c. Contract farming arrangements to encourage new seaweed farmers</li> </ul>	<p style="text-align: center;"><u>Threats</u></p> <ul style="list-style-type: none"> <li>a. Low prices due to changes in global supply and demand for seaweed</li> <li>b. Climate change reduces suitability for seaweed production e.g. rising sea temperature</li> <li>c. Pollution of seaweed growing areas from other users e.g. run-off from agriculture</li> <li>d. Conflict with other land users e.g. fishers</li> </ul>

### Associated projects

ADB - Water Harvesting Agriculture Improvement Project: The Water Harvesting Agriculture Improvement Project (WHAIP) is a proposed ADB sovereign financed project (No. 55139-001) which aims to improve livelihoods, food security and climate and disaster resilience of selected rural communities in Atauro, Manufahi, Manatuto, Metinaro, and Oecussi. The project has a total budget of \$76 million over six years, made up of a \$70 million loan and a \$6 million grant. WHAIP will enhance the resilience of agriculture-based communities through landscape management solutions that address water supply reliability and protect lives, farms and infrastructure from floods; improve the productivity of farms and agroforestry through climate-smart approaches and enhance market linkages.

The project follows a community-based approach where villagers plan and implement a combination of investments in water and rural infrastructure, agriculture and agroforestry, and capacity development. Government and village institutional capacity will be strengthened through technical support and training in infrastructure design and construction, climate change mitigation and adaptation, and landscape management.

The expected impact of WHAIP is ?Climate resilience, food security, and economic opportunities of Timorese people improved? and the expected outcome is ?Livelihoods and resilience of selected rural communities improved?, similar objectives to the seaweed project. Both projects will cover Atauro municipality and Metinaro Administrative Post in Dili municipality.

FAO - Indonesian Seas Large Marine Ecosystem (ISLME): The ISLME is a four-year GEF-funded project, implemented by FAO, covering selected areas of Indonesia and Timor-Leste. The total budget for both countries is \$19.5 million over four years (2018-2022). The project objective is to develop and agree on a Strategic Action Plan to reduce stress on marine resources and ecosystems through an improved understanding of large marine ecosystem processes and the development of sustainable ecosystem-based management actions, promoting increased resilience to climate variability and change. ISLME has three components: i) Identifying and addressing threats to the marine environment including unsustainable fisheries, ii) Strengthening capacity for regional and sub-regional cooperation in marine resources management, and iii) Coordination with regional information networks, monitoring of project impacts, and dissemination and exchange of information.

ISLME has identified pilot sites in Biacou (Bobonaro municipality) and Metinaro (Metinaro municipality) to carry out Ecosystem Approach to Aquaculture (EAA) and Maritime Spatial Planning (MSP), focusing on seaweed production. The GEF seaweed project will work within the ISLME framework and also cover the municipality of Metinaro.

Department of Foreign Affairs and Trade (Australia) - Market Development Facility: The Market Development Facility (MDF) has recently supported seaweed production on Atauro through carrying out a needs assessment and providing training on improved cultivation and post-harvest handling techniques direct to seaweed farmers. Although further support may be provided, there is no formal framework of assistance.

Others: The United Nations Development Programme (UNDP) has previously provided funding to build seaweed storage units on Atauro for groups such as the Cottonii Cooperative. UNDP does not plan to finance the building of any more storage facilities but may continue with support to microfinance for seaweed farmers.

WorldFish has previously carried out a value chain study of seaweed on Atauro in 2019<sup>[20]</sup> but based on consultations during project preparation, does not have any plans for any follow up work at present.

### **Proposed alternative scenario**

The project "Enabling transboundary cooperation for sustainable management of the Indonesian Seas" (ISLME) managed by FAO as GEF Agency covers mostly Indonesian waters but also includes Timor-Leste. The area is located in the heart of the biogeographical area of the western Indo-Pacific ocean, which has the richest marine species in the world. There are 500 species of coral reefs, 2,500 species of marine fish, 47 types of mangroves and 13 species of seagrass.

There are 16 provinces in Indonesia which are side by side or part of the ISLME area. However, the ISLME project prioritized only six locations as the pilot projects including the Java Sea (WPP 712),

East Kalimantan waters (WPP 713), Flores Sea waters in East Flores, NTT, and Lombok Waters (WPP 714/573).

Among other things, the FAO-GEF project aims to strengthen regional cooperation and support for effective sustainable management for the ISLME region and improves management of fisheries resources and food security by gender mainstreaming and other technical interventions.

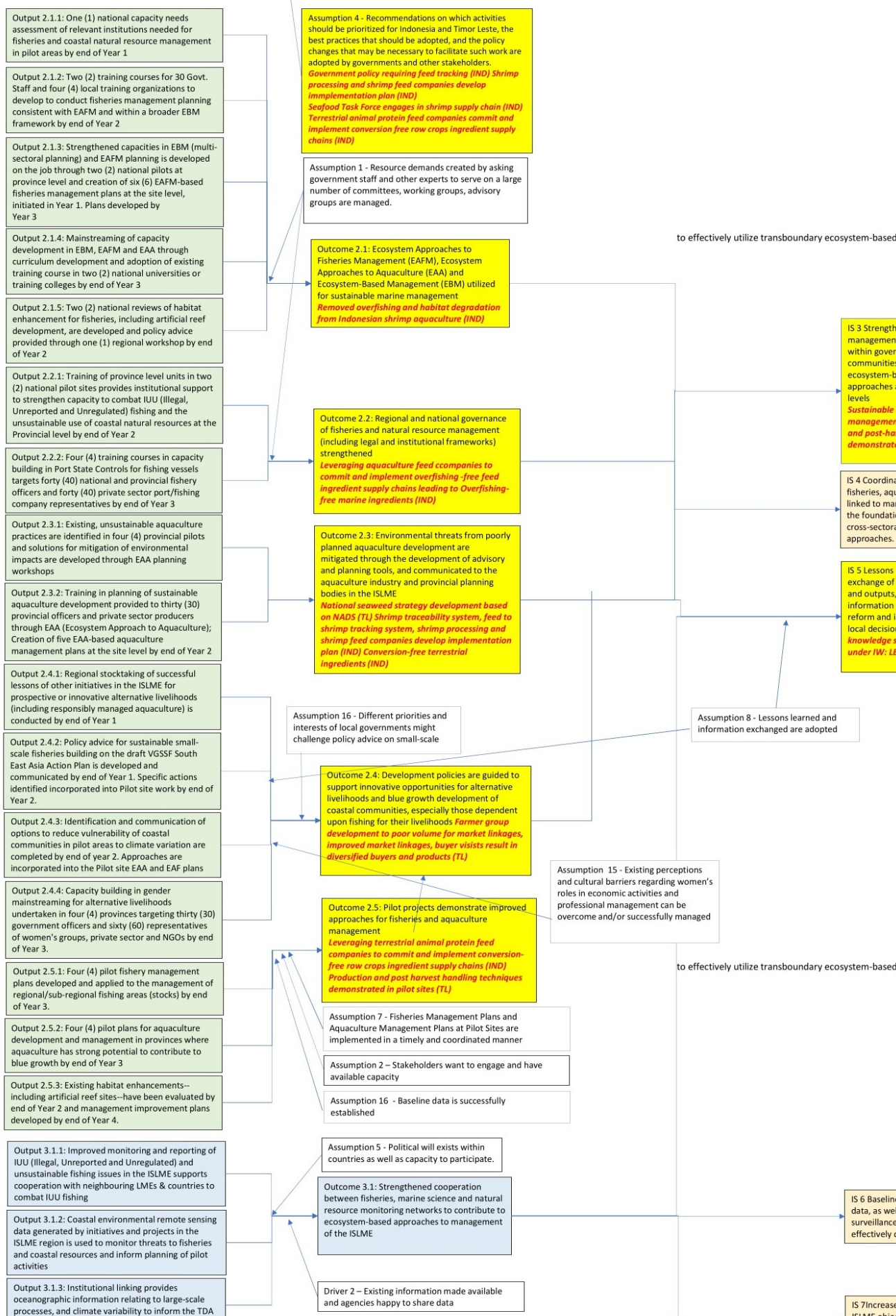
The ISLME transboundary diagnostic assessment is ongoing at this time, but as shown in the ISLME Theory of Change, the impact of the capture of juvenile and undersized fish for shrimp feed is impacting the whole system and is further aggravated by the weak law enforcement and limited capacity in monitoring, control and surveillance. This contributes to the vulnerability of coastal communities across the region. The ADB-GEF project support of seaweed in Timor-Leste aligns with the ISLME sustainable resources management interventions, building livelihoods while addressing gender mainstreaming as part of the livelihoods approach. The seaweed support will also bolster the ISLME's Output 2.3 mitigation of poorly planned aquaculture and Outcome 2.4 poor linkages to market. Coastal vulnerability will also be addressed in Timor-Leste through support for livelihoods, which target women entrepreneurs .

This ADB-GEF project (ID 10867) will contribute to the overarching objectives of the ISLME and the emerging Strategic Action Programme (SAP). It fits well within the overall ISLME Theory of Change architecture. In the schema below the project actions are nested in **red** font. [Note: the full ISLME TOC is annexed in the ROADMAP]. This is complemented by the individual country and sector level Theories of Change directly supported by the ADB-GEF project.

**Figure: ISLME Theory of Change as it relates to this GEF project**

Component 2: Strengthening capacity for regional and sub-regional cooperation in marine resources management

Component 3: Strengthening networks, monitoring of project impacts, and change of information



**Indonesia:** The overall vision of the project is to disrupt the opaqueness of shrimp aquaculture feed supply chains to put in place measures that can track the marine ingredients in shrimp feed, define and shine a light on the use of trash fish and hold those carrying out IUU fishing and other activities of an improper nature accountable, while demonstrating the removal of a roadblock to advancing the effort for increased seaweed aquaculture in the ISLME. The overall theme of this project is to demonstrate that GEF can mitigate the worst forms of aquaculture while amplifying the best forms of aquaculture for a broader ecosystem-based approach to improved aquaculture governance and subsequent environmental benefit.

Aligning the intentions of the government with the GEF project requires national strategies to be developed. Both the Indonesian government and the Timor-Leste government confirm that national strategies for shrimp and seaweed, respectively, will be developed through the project. The importance of national strategies is the direction and scope of priorities for countries. Considering this project will support these strategies, it presents a clear opportunity to use this project to assist in setting the direction for the future of shrimp farming in Indonesia and the future of seaweed farming in Timor-Leste.

#### Mitigation of IUU and Overfishing in Indonesian Shrimp Feed Supply Chains

- The global and local challenge to the aquaculture sector is to create greater accountability in feed ingredient procurement, but this is hampered by (1) the lower magnitude of shrimp aquaculture feed (and aquaculture feed more broadly) compared to poultry, swine and beef feeds, (2) the inability to create market incentives for better feeds produced with better feed ingredients because (3) feed ingredient production is a 'black box' with little to no accountability and no true verification of claims being made. Lastly, (4) there is little to no traceability of shrimp product from the processor back to farm.

The proposed GEF project will join a movement that is growing with multiple concurrent global targets to remove the opaqueness in feed supply chains and create a more accountable sector that is forced to take responsibility for the environmental (conversion and overfishing) and social (forced and bonded labour, child labour, and modern slavery) impacts of feed ingredient procurement.

The proposed project has the best opportunity for success. The following Indonesia components are considered the best approach to limiting the impacts of shrimp aquaculture feed. Note that not all components are proposed to be funded by the GEF.

- ADB Proposed Loan Project - Indonesia: The Infrastructure Improvement for Shrimp Aquaculture Project (the project) will help the Ministry of Marine Affairs and Fisheries (MMAF) in introducing sustainable shrimp aquaculture and improving transparency, and traceability processes towards increased productivity, quality, profitability, and environmental sustainability of smallholder's shrimp farming. The project will deliver an integrated investment addressing upstream, production, and downstream processes through infrastructure, capacity support to improve farming practices and post-harvest systems, and value chain strengthening in seven provinces. The project will deliver three outputs: (i) Output 1: quality and sustainable inputs production increased, (ii) Output 2: sustainable aquaculture infrastructure and services developed, and (iii) Output 3: shrimp aquaculture value chain strengthened.

- Proposed GEF Project ? Indonesia: Create feed to shrimp tracking system modeled off the STF's Feed Information Form. This tracking sheet must be harmonized (across all feed companies in a country) such that it is provided by the feed companies in their feed information packets to farmers. In collaboration with the government, feed companies, and shrimp processors, these feed tracking sheets will become



mandatory to have shrimp purchased by brokers or processing plants. The electronic traceability system that is being developed under the ADB loan will serve as a fundamental component that will have the flexibility to track feed.

Proposed GEF Project ? Indonesia: Once electronic traceability to farms is implemented (likely through the MMAF STELINA[21]21 system) in partnership with the ADB loan Infrastructure Improvement for Shrimp Aquaculture Project[22]22, the feed companies and brokers can be engaged to provide transparency into the sources of their raw materials. A supply chain analysis of Indonesia's aquaculture feed sector will be performed to understand the risk and magnitude of environmental impacts from the country's feed sector. Utilizing their supply chain analysis and the implementation of the feed to the shrimp tracking system, ADB and partners will engage the STF which is expanding its scope from Thailand to India, Viet Nam, and Indonesia. The analysis performed will serve as providing the context necessary for the retail and food service members of the STF to begin their Indonesia expansion. This will create leverage over the shrimp processors in Indonesia. The shrimp processors will need to engage the feed industry because now their buyers will be requiring greater oversight and backing the feed to the shrimp tracking system.

WWF and partners leveraging private sector - Global: WWF is currently engaging all major animal feed companies around the world to commit to conversion-free and overfishing-free feed ingredients. This work is led out of the WWF US office but it is global in nature by tapping all their network offices that have major feed company headquarters located in their countries to press for these commitments. While WWF is utilizing multiple points of leverage, one key aspect of this work is the development of a feed ingredient decision support tool that is intended to be used to protect both retail/food service and investors that cannot make purchasing and lending decisions based on a large "black box" of liabilities. The combination of corporate social responsibility with the materiality of risk in feed supply chains will be used to leverage greater commitments and their implementation.

Seafood Task Force (STF) ? Private Sector: The STF (Formerly the Shrimp Sustainable Supply Chain Task Force)[23]23 is a unique multi-stakeholder alliance consisting of European and American retailers, their suppliers, NGOs, and the major Thai shrimp processors and feed companies who have spearheaded major reforms in the Thai shrimp (and seafood industry) since the April 2015 EU Yellow Card[24]24 was given to Thailand. By early 2019, the EU removed the yellow card and most of the gains were attributed to both the Thai government and also the STF for their work in improving their seafood chains and human and labor rights. The STF comprises most of the major suppliers of shrimp to the US and EU (Walmart, MARS, Nestle, Ahold, and many others) as well as non-government organizations and seafood standard certifying bodies such as MarinTrust[25]25, the Aquaculture Stewardship Council[26]26, and the Marine Stewardship Council[27]27. The project is working with STF to build on their Thailand reforms experience with the current members who also have significant operations in Indonesia. BSTF has designed a shrimp traceability tool and feed-to-shrimp tracker that can be modified for use in Indonesia. With retail and food service pressure, the shrimp processors will have to collaborate and organize with each other to revise their Thailand system and fit it into Indonesian settings and create a system to meet the demands of supply chains, buyers, and investors alike.

The Seafood Task Force provides an opportunity for a subsector of Indonesian shrimp businesses to engage in a preformed pre- competitive platform. This allows the industry to work towards the broader

---

collective good in a non-monopolistic manner that steers well away from competition rules in vital shrimp market countries. The engagement of the STF with Indonesia will build on the momentum from Thailand (and the industry leaders from Thailand) and align with this project in a synergistic way to foster great change. The investments by all change agents described will take a minimum of 3-5 years of investment to realize the theory of change (see below).

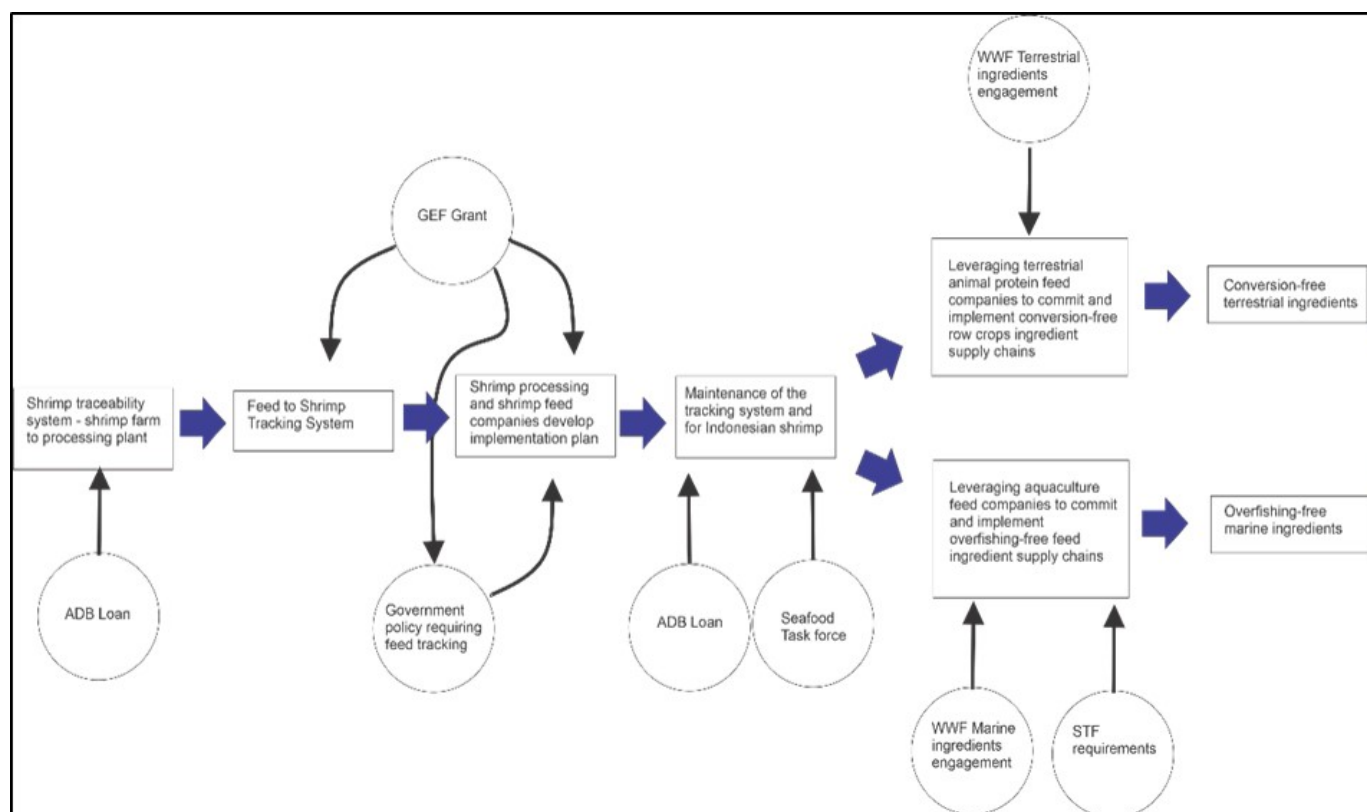


Figure 15: Theory of Change (Indonesia intervention) - The interactions and interdependencies of multiple institutions with leverage in different parts of the feed supply chains are currently active and represent an opportune moment for the implementation of this theory of change to be implemented in Indonesia.

#### Enabling Private Sector Engagement in Policy

At first look, the Shrimp landscape of Indonesia looks fragmented. Few organizations (beyond KKP) and some business institutions such as KADIN can see the whole sector, primarily due to its vast complexity and geographic separation across the archipelago. The project will need to be a bridge to weave and engage across this broad ecosystem of partners if it is to be successful while engaging those with a limited voice, such as the thousands of shrimp farmers and workers and the coastal communities across Java, Kalimantan and Southern Sumatra. They rely on the industry for their well-being. Outcomes 1 and 2 provide opportunities to engage a diverse and dispersed shrimp farmer and shrimp worker sector. Other stakeholders that should also be engaged are those who significantly impact the industry, such as the financing sector and banking, who continue to invest in the industry.

Outcome. 1.2. The Marketing and business plan also provides an opportunity to go beyond the national private sector and engage the supply chain of the key markets in Japan, Europe, and the USA. Understanding global food chains' social, ecological, and carbon implications and how to best drive innovation and alignment with key markets over the short to medium term will be essential for a successful Indonesian Shrimp Plan.

Outcome 4.1. Takes a step further and connects the missing piece for the Indonesian shrimp sector by looking at the supply chains that supply the shrimp feed mills. Outcome 4 will provide a lot of clarity and transparency around these supply chains that rely on global IUU fisheries or unregulated and unlicensed fisheries operating within Indonesian waters. Outcome 1.2 will provide critical intelligence on the market dynamics and incentivize the transition from trash fish and wasteful shrimp management practices to more efficient and more economically viable methods. This outcome is mainly for the shrimp farmers and the over 6 million fishers that rely on 'trash fish', which are the forage species that supply food to their target fisheries and neritic tuna species common across the country's archipelago.

The project will address the changing division of labour in the aquaculture supply chain. It will ensure that: i) women's knowledge of environmental management is captured in strategy development, action planning, implementation, and downstream business operations, ii) new techniques and good practices in aquaculture take gender considerations into account, iii) women engage in industry consultations and are trained in good aquaculture practices across the entire value chain to enable broader participation in the sector, as well as improve business acumen.

The project will also address capacity of Government executing and implementing agencies to encourage and supervise gender action plan implementation. It will ensure that: i) EAs/IAs have internalized policy and practice with respect to gender equality that are aligned with ADB and GEF principles, ii) EAs/IAs are judicious in gathering and curating sex-disaggregated data related to the project implementation, iii) EAs/IAs will encourage policy support to provide gender equal access to land and pond ownership through inheritance, and to financing programs. This includes gender-equal mechanisms for land and house ownership, including clear and accessible gender-equal title registration, and iv) gender specialist(s) are engaged for the GEF and ADB co-financed projects, to support project implementation and contribute to the design of all knowledge management activities.

Increasing access and control over resources: The project will ensure that: i) sex-disaggregated data includes considerations related to access and control over resources (e.g. land, water, capital, etc), ii) impacts of design of new techniques and approaches are discussed with and in to take account of women's views, iii) men and women have equal access to benefits of project interventions, iv) women have a legal or traditional right as owners / managers of natural resources.

Enhancing women's social status and role as decision makers in sustainable aquaculture: The project will make efforts to ensure that: i) women and men have equal access to information, including equal access to interaction with 'buyers' such as those represented in the Seafood Task Force and Safe Seaweed Coalition, ii) any proposed policy and legal reforms contribute to increasing women's status in the industry, iii) affirmative actions are supported to allow women to take leadership roles in stakeholder organizations, including government, business / industry, and civil society.

Fundamentally, GEF's contribution to halting conversion and overfishing will be in the form of an accountability system for Indonesian shrimp feed. This accountability must be in place prior to claims made about feed ingredient sustainability. It is a critical component that GEF is best placed to fund to coalesce the complementary support from the private sector, lending, NGOs, and pre-competitive platforms.

### **Changes to PIF - Indonesia**

The following revisions have been made to the 'alternative scenario' for Indonesia since the preparation of the PIF. The revisions are based upon the ground-truthing undertaken in September 2022 and consultations with the Government and stakeholder through to December, 2022.



Original edition in PIF	Revised edition	Rationale for revisions
1.1.1 National Action Plans for Shrimp Aquaculture adopting aquaculture management area (AMA) approach, including climate change mitigations and resiliency prepared through multi-stakeholder consultations to increase the environmental sustainability of the shrimp aquaculture sector executed (Indonesia)	Output 1.1.1: Indonesia - National Action Plan for Shrimp Aquaculture adopting Ecosystems Approach to Aquaculture (EAA[1])[2] including climate change mitigations and resiliency prepared through multi-stakeholder consultations - to increase the environmental sustainability of the shrimp aquaculture sector executed. Executing partner BAPPENAS.	<p>The approach now recognizes the latest Indonesian legislation which adopts the FAO Ecosystems Approach to Aquaculture (Which integrates the Area Management Approach)</p> <p>1] FAO Guidelines the Ecosystems Approach to Aquaculture[1]</p> <p>[2] Technical guidelines for managing aquaculture areas using an ecosystems approach from KKP DGA Regulations Number 154/Per-DJPB/2019. Technical Instruction for Aquaculture Area management with an Ecosystem Approach</p>

-

-

-

#### Timor-Leste:

The following revisions have been made to the 'alternative scenario' for Timor-Leste since the preparation of the PIF. The revisions are based upon the ground-truthing undertaken in September 2022.

Original edition in PIF	Revised edition	Rationale for revisions
3.1.1. Quantification of ecosystem services through methodologies developed by the GEF 7 Blue Horizons seaweed project and adopted in Timor-Leste	Output 3.1.1: Blue carbon credit payment agreements facilitated for seaweed ecosystem services.	Blue Horizons is no longer developing ecosystems quantification methodologies

Outcome 3.2 Site for improved post-harvest handling and seaweed processing/storage systems to meet market demand created	Outcome 3.2 Seaweed farmers increase production and adopt sustainable seaweed production techniques	The focus is now on increased sustainable production, not just post-harvest handling
Output 3.2.1: Pilot sites in and around Dili Municipality established as a centre of excellence in the post-harvest training for government and seaweed growers with a focus on female-centred opportunities to capture greater value from seaweed harvested. (Timor-Leste)	Output 3.2.1: Sustainable marine resource management and planning demonstrated in Atauro and Metinaro.	As an extension methodology, it is better to have several community-based demonstrations, rather than a Centre of Excellence managed by experts ? now moved to Output 3.2.2  Sustainable marine resource management, using tools such as EAA, now identified as an issue for seaweed farming
Output 3.2.2 - none	Output 3.2.2: Improved production and post-harvest handling techniques demonstrated in Atauro and Metinaro	
Component 4: Downstream market specification adoption	Component 4: Improved market linkages	Focus is now on improving broader market linkages, rather than limiting to quality standards, as quality is not a priority for the carrageenan market
Outcome 4.1: Timor-Leste seaweed sector engaged/aligned with the Safe Seaweed Coalition	Outcome 4.1: Timor-Leste Seaweed farmer groups engage with more diverse markets	The support required to improve market linkages and diversify markets is beyond the current scope and capacity of SSC

Output 4.1.1: Hosting of pre- and post-project inspection by Safe Seaweed Coalition to support national targets for seaweed aquaculture in Timor-Leste	Output 4.1.2: Traders and seaweed farmer group leaders trained in contract brokerage and export procedures  Output 4.1.3: Seaweed traders and farmer group leaders network with international buyers	SSC does not carry out inspections.  The main constraints are not quality standards but negotiating contacts with overseas buyers and complying with export procedures.
Output 4.1.2: Demonstrated implementation of better management practices and higher quality control, and association of seaweed aquaculture supply chain actors in Timor-Leste		Better management practices are included under Component 3.
Output 4.1.3: Seaweed Growers Association concept enabled, to pool leverage and maintain adherence to better practices and quality control of seaweed production and seaweed products. (Timor-Leste)	Output 4.1.1: Seaweed farmer groups strengthened to aggregate and store RDS	Seaweed Association implies an apex organization. The focus is now on strengthening the main functions of farmer groups ? aggregation and storage.

[1]FAO Technical Guidelines for Responsible Fisheries,  
<https://www.fao.org/3/i1750e/i1750e00.htm#:~:text=%E2%80%9CA%20ecosystem%20approach%20to%20aquaculture,interlinked%20social%20ecological%20systems.%E2%80%9D>

The outcomes and outputs of the project are interrelated and the reliance on other GEF projects is integrated into the current project. The vision of the project in Timor-Leste is to identify ways to amplify ecosystem services of seaweed aquaculture by increasing seaweed production and exports. These conditions will be improved through the actions described below.

The main constraints to increasing seaweed production and the provision of ecosystem services in Timor Leste are volatile prices and uncertain markets. Seaweed from Timor Leste supplies carrageenan

processors in other countries and when prices fall, international buyers stop purchasing seaweed from Timor Leste and there are no alternative market outlets for farmers. To overcome these barriers, Timor Leste needs to reposition itself in the global marketplace. Increasing production will attract more buyers and engaging with more diverse buyers will reduce reliance solely on the carrageenan market.

Several community-based demonstration sites will be established promoting improved production and post-harvest handling techniques in Atauro and Metinaro. A seed nursery will also be established at the National Institute of Fisheries and Aquaculture in Liquiçá to test new cultivars for distribution to seaweed farmer groups. Experience in other countries has shown increasing seaweed production can lead to conflict amongst users of the shared marine resource. Therefore, the Environmental Approach to Aquaculture methodology will be used for the sustainable planning and implementation of increased production.

Linking with alternative markets to the carrageenan market will be supported through networking events. Alternative markets will include feed processors, including shrimp feeds, and bio-stimulants. The supply chain will also be improved through the strengthening of farmer groups for aggregation and training exporters in contract brokerage and export procedures. Because seaweed is supported broadly as beneficial activity, if cited appropriately, this project will engage the GEF 7 Blue Horizons project to assist in international market engagement by cooperating with the private sector engaged in the Blue Horizons project, Safe Seaweed Coalition (SSC) and Jaringan Sumber Daya Informasi dan Teknologi Rumput Laut (JaSuDa). This will also lead to greater international market awareness.. Lastly, the project in Timor-Leste will also foster an understanding of the marketing aspects of the ecosystem services of seaweed and how to quantify these aspects for better market penetration.

To provide a roadmap for the above Theory of Change, a National Seaweed Aquaculture Development Strategy will be prepared for Timor-Leste, based upon priorities identified in the National Aquaculture Development Strategy.

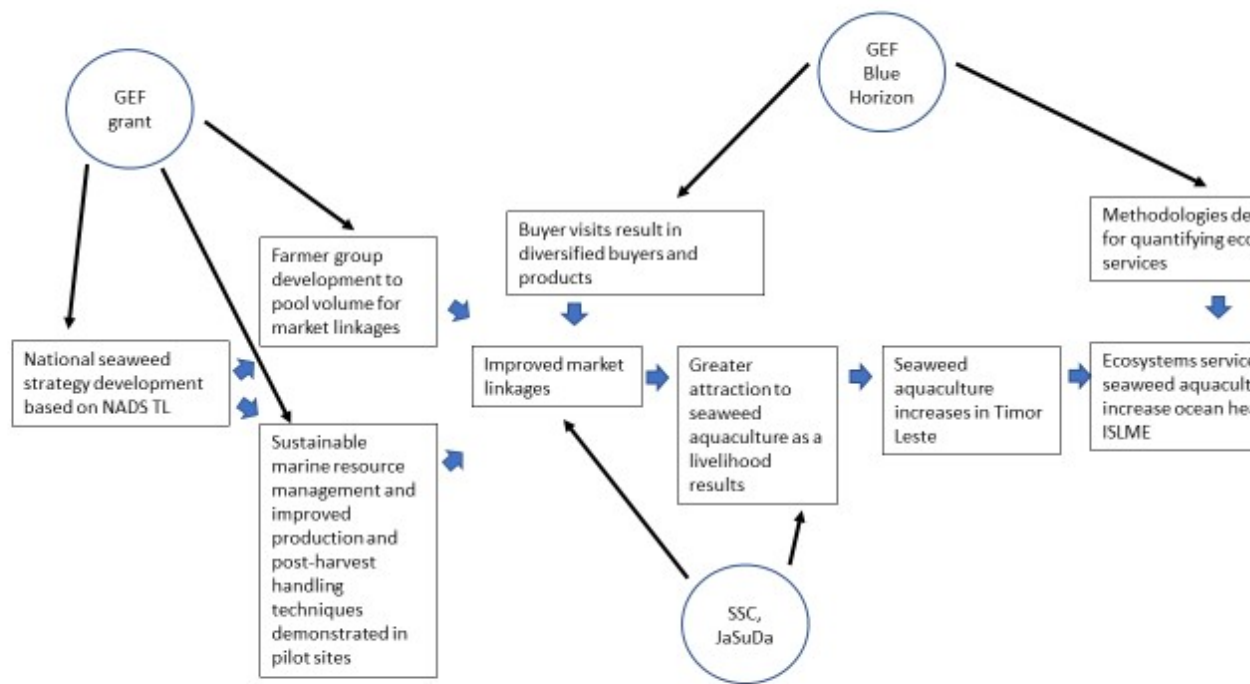


Figure 16: Theory of Change (Timor-Leste intervention): The interaction of multiple GEF projects with leverage from international demand provides the theory of change to be implemented in Timor-Leste.

The project targets will be achieved through the following components, outcomes, and outputs:

#### **Component 1: National strategies**

***Outcome 1.1: Development and implementation of national strategies for priority commodities. (Indonesia and Timor-Leste) (\$570,000)***

The development of national strategies for shrimp aquaculture and seaweed aquaculture represents a governmental direction and approach towards better production which will form the impetus for change.

***Output 1.1.1: Indonesia - National Action Plan for Shrimp Aquaculture adopting Ecosystems Approach to Aquaculture (EAA/28/28)/29/29 including climate change mitigations and resiliency prepared through multi-stakeholder consultations - to increase the environmental sustainability of the shrimp aquaculture sector executed. (led by BAPPENAS)***

Some elements of the national action plans will include:

*Mapping of land requisition requirement to determine the area distribution of integrated shrimp ponds including the existing areas*

Shrimp farm renovations will require appropriate land tenure and adjacent land tenure for controlled intensification and sparing of land for mangrove rehabilitation. Quantification of production area and land spared will form the new ecological footprint of proposed renovated sites.

*Protocol to improve the implementation of quality assurance and safety of shrimp products developed including the traceability procedures.*

Chemical use, shrimp transport time, shrimp quality, and traceability are key aspects underpinning the shrimp aquaculture renovations that are required to access markets but also to put new controls on supply chain interactions and origin of a product for any interventions into farming practices and time to processing.

Some elements of the national action plan will include (but not be limited to):

The national plan will examine the current condition, trends, and opportunities for Indonesian Shrimp Aquaculture. Design a design, planning, and consultation process to include all major stakeholders throughout the supply chain. Conduct a comprehensive gap analysis of the current status of Shrimp in Indonesia for at least the following headings 1. Infrastructure 2. Product quality control 3. Access to Credit 4. Market coordination 5. Feed quality and availability 6. Production costs 7. Banned chemicals / antibiotic use 8. International market prices 9. Seed stock quality 10. Environmental management 11. International trade barriers 12. Access to disease-free bloodstock, husbandry, and health 13. Production costs ? 14. Feed/Fishmeal 15. Public Relations Management 16. Conflicts with other users 17. Policy landscape, industry and farmer coordination and jurisdiction 18. Third-Party Standards and Certification 19. Feed mills and their role 20. Farm types and potential for growth, 21. Technology and innovative opportunities 22. Spatial planning for shrimp aquaculture.

*Multi-stakeholder coordination to harmonize various policies and laws related to the development of sustainable shrimp aquaculture including identifying existing policy and regulation gaps*

The importance of stakeholder input to develop balanced policy approaches that allow the business to remain viable while appropriate safeguards and regulations are put in place to provide the government of Indonesia to have the mandate to enforce these policy changes is critical. The development of policies without stakeholder input could cause distrust and non-compliance with laws and these policy and gap analyses will address concerns of overregulation, redundancies, and contradictions in law. Key stakeholders to include in the consultation process include the *Gabungan Perusahaan Makanan Ternak (GPMT)* (Indonesian Feedmills Association), *Masyarakat Akuakultur Indonesia (MAI)* (Aquaculture Association of Indonesia), and the recently formed Shrimp Club of Indonesia who comprises the majority of stakeholders of the industry, research organizations, the feed sector, and farmers.

The outputs will include a draft road map of priority issues and opportunities for the Indonesian Shrimp Industry and execute a comprehensive multi-stakeholder consultation process with all Indonesian and a subgrouping of International (as appropriate) Shrimp buyers to amend, update and validate the assessment.

*Building climate mitigation and resilience into the national action plans*

Shrimp farming has historically been associated with the clearing of mangroves, a practice that has had negative environmental consequences. The national action plan will examine the implementation of the

new law in Indonesia which prohibits mangrove conversion and suggest actions to increase mangrove cover for obvious ecosystem benefits but also rehabilitate abandoned ponds. It will further review actions that can be designed to promote resilience to climate change at all stages in the shrimp value chain, including seed, broodstock, feed, production, and marketing.

*Advancing a research and development agenda in the national action plans*

Transforming the shrimp aquaculture industry towards sustainable pathways will require considerable research into new areas. This will include such areas as the development of quality seed, quality control, monitoring, and testing facilities, alternative sources of protein for fishmeal, etc that relate to Project Outcomes 2.1 A credible and functioning feed management system

In addition to a thorough review of the current trends in the industry, the coverage of sustainability issues covered by third-party certification programs such as Best Aquaculture Practices (BAP), the Aquaculture Stewardship Council (ASC) and highlighting the efforts of Indonesia to reduce the use of unsustainable sources of feeds in their shrimp industry (project output 1.1.1). This activity will need to look further beyond current certification schemes to look into potential future regulations and buyer requirements such as animal welfare and addressing labor standards and wages of people working in the industry and ensure the work of this output is adequately considered in Project Output 1.1.2 the Marketing and Business Plan.

This Outcome will provide a comprehensive plan and roll out strategy for the shrimp industry for integration into the National Medium Term Development Plan, KPIs (and budget allocations) will signify support by the respective government authority KKP and BAPPENAS. This work also provides a strong opportunity to leverage (and be leveraged by the proposed ADB Loan to the Government of Indonesia to improve the Shrimp industry) as well as providing a strong foundation for the development of Project Output 1.1.2 Marketing and business plan for renovated shrimp sector, project output 4.2.1 engagement with the Seafood Task Force (STF) and become an important knowledge management product for sharing in output 5.1.2 sharing of good practice in IW: LEARN regional meetings, across GEF Large Marine Ecosystems and in global shrimp forums.

*Output 1.1.2: Marketing and business plan for renovated shrimp sector for the greater magnitude of market reach developed (led by BAPPENAS)*

The Indonesian government will require the development of a marketing strategy that highlights the improvements made with the renovation of the shrimp sector. There are ample means by which to access markets, but not all markets will be targeted and thus, attention to the reasons why (political, revenue, security) certain markets are targeted over others will be considered. This strategy will also include a business plan template for how to maintain market engagement and market expansion. Business plan development [will](#) consider national action plans as well as broader governmental and private sector priorities. The business plan development will demonstrate that there is a new desired end state for the shrimp sector in Indonesia and this end state [will](#) be articulated by the improved economic and sustainability aspects that are realized in the business plan implementation.

Building on the Shrimp National Action plan (output 1.1.1), a market-based research protocol, and consultation process will be designed to engage major stakeholders throughout the supply chain in prioritized international markets (such as but not limited to China, the US, Japan, and Europe). Strategic advice and engagement with members of the Seafood Task Force (STF) as part of Output 4.2.1 will be strategic as part of this work. The review will identify Indonesian shrimp as currently the third-largest shrimp producer in the world (with roughly 12% of the market (in 2021)) in the market vis a vis other main global competitors (China, India, and Chile) and identify opportunities for differentiation in the market.

This workstream will identify priority shrimp products, new opportunities, and their corresponding markets and facilitate a series of Focus Group Discussions to validate various brand looks and identities

with the respective markets, as well as doing considerable primary and secondary data consolidation that looks at global trends in shrimp markets. Although this output will be directly overseen by BAPPENAS, the KKP Directorate General Of Strengthening Competitiveness Of Marine And Fisheries Products Is mandated with marketing and dealing with international markets, and the Directorate has a Director of Business and Marketing whose mandate is to (i) consult with the private sector, key clients, and export players for the shrimp aquaculture market; (ii) lead formulation of the marketing and business plan in consultation with all MMAF Directorate General; and (iii) disseminate the marketing and business plan to relevant stakeholders. Strong coordination between BAPPENAS and the KKP in this output is strongly recommended as is engagement with KADIN (Chamber of Commerce in Indonesia), the Department of Trade and Industry, and other key stakeholders.

The outputs of this work will lead to the design of a market and branding plan for the look and feel of priority shrimp products across the different products from Indonesian shrimp markets, identify opportunities to differentiate Indonesian Shrimp in the global market, and identify critical trends in the overall market. These branding plans will be pilot tested in critical markets and main buyers of shrimp, noting again that engagement with members of the Seafood Task Force (STF) as part of Output 4.2.1 may be strategic as part of this work as key business sectors throughout the shrimp supply chain

The findings from this output are also important to feed back into *Output 1.1.1: Indonesia - National Action Plan for Shrimp Aquaculture* and ensure Indonesia's Shrimp industry stays ahead of market trends, building on sustainable and profitable growth

The outputs here will also include a business plan template for how to maintain market engagement and market expansion. These activities will require funds, conceivably, for tax revenue from the sector. Business plan development [will](#) be integrated with the national action plan as well as broader governmental and private sector priorities. The business plan development will demonstrate that there is a new desired end state for the shrimp sector in Indonesia and this end state will be articulated by the improved economic and sustainability aspects that are realized in the business plan implementation through a positive feedback loop that integrates Output 1.1.1 (National Shrimp Plan) and this output, as well as providing support to Outputs 5.1.1 (Learning and Sharing of knowledge), 5.1.2 (Sharing of Good Practice across GEF supported LMEs) and to outputs 5.1.3. (Knowledge management and communication products), and alongside industry shows and international events to showcase a rebranded Indonesian Shrimp product that is founded on the Indonesian shrimp industry aspirations on sustainability and reduction of unsustainable sources of feed funded across this GEF supported work and outlined in the project outputs

*Output 1.2.1: National Seaweed Aquaculture Strategy prepared through multi-stakeholder consultations - aligned with National Aquaculture Development Strategy to increase the environmental sustainability and ecosystem services of the seaweed sector (Timor-Leste).*

Planning for the expansion of seaweed aquaculture will require national attention to the direction of the industry, the uptake of new livelihoods, and the extension support that will be allocated for a vibrant seaweed aquaculture sector. The strategy will provide the government mandate that affords greater support to the expansion of the seaweed aquaculture industry in Timor-Leste. It will be closely aligned with and complement the National Aquaculture Development Strategy (referenced in the previous section). Within the national seaweed aquaculture strategy, a long-term sector plan could unlock resources from other sectors such as fish processes and storage excess or abandoned capacity. Within the sectoral plan, potential ramifications of shifting capacities and changing livelihoods will be considered in terms of the trade-offs and the sustainability of the livelihoods created, as well as the value of livelihoods both from an ecological value but also from an economic value to beneficiaries. While the sectoral plan will identify options for livelihoods created through increased quality of seaweed aquaculture products, it will also consider the human capital needs for a vibrant seaweed sector and the potential shifts in livelihoods this may create. Those shifts might draw capacity from other sectors and these implications will be considered.



An international seaweed strategy expert will be recruited to support NDFA, prepare the strategy through a series of workshops and consultations to establish a baseline for the seaweed sector and then finalize and endorse the strategy amongst all stakeholders. When completed, the strategy will be publicized through a series of public awareness campaigns in seaweed-growing areas. In addition to MAF, Government stakeholders are likely to include the Ministry of Finance; Ministry of Tourism, Commerce, and Industry; Ministry of Planning and Territory; Local Government authorities; Secretary of State for Environment; Trade Invest, and Timor-Leste Customs Authority. Private sector stakeholders will include representatives of seaweed farmer groups and seaweed traders/exporters

Implementing the strategy will require a methodology that supports and contributes towards the strategic goals, therefore, it is proposed to use the Ecosystem Approach to Aquaculture as a basis for implementation. Components of the National Seaweed Strategy may include

*a. Core Regulatory framework*

The structure of regulations and policies that touch components of seaweed aquaculture need to be understood and potentially adjusted. Policy and regulations typically are light on the parameters of sea farming and thus, care must be given to ensure policy does not create challenges for initiatives the government wants to see taken forward.

Analysis carried out under Output 3.1.3 (policy and regulatory gap framework analysis) will inform the development of the National Seaweed Aquaculture Strategy. It will likely include ?licensing? to allocate a specific area at a specific location for the production of seaweed for a specific time period and assures tenure for the seaweed farmer. Licensing will be linked to ?zoning? for marine-use planning amongst multiple users and to maintain a sustainable carrying capacity. Other regulatory issues may include export procedures, including phytosanitary certificates.

*b. Research, development, and extension*

If the government is intending to grow an industry for seaweed aquaculture, the ongoing costs of support, extension, and the research that grounds this science and justification will be considered with overall budgets in mind and the anticipated revenue that government could use to provide this vital support mechanisms for farmers but also for the those that may question some of the negative impacts of seaweed farming such as mammal entanglements.

*c. Market access, type, business plan, and target markets*

Growth of a private sector does not come naturally, focussed business planning backed up by clearly targeted markets is critical. Market targeting is one of the most important aspects of strategic business planning. All markets cannot be targeted. Resources for a specific market and business planning, if invested correctly and followed, pay dividends when a strategy review takes place.

*d. Biosecurity, disease prevention, and early warning systems*

As with any living organism, diseases can have an epidemic-size impact on culture areas. These diseases are expected to be amplified because of the changing climate and the level of pathogenicity that comes from creating more optimal conditions for disease-causing organisms. Seaweed is no different and selective breeding, strain selection, mortality diagnostics, and warning, and quarantining systems are all key aspects to be considered in providing a support structure to ensure disease from one farmer doesn't cause the collapse of an industry.

*e. Social license to operate in the ocean commons*

Fishers have traditionally had access to the commons for fishing. Aquaculture is relatively new and ocean-based farming is even newer. The placement and expansion of aquaculture areas will come with constraints from local communities that do not want to see the activity of aquaculture or its expansion

unless they are directly benefiting from it. Considerate approaches to siting and community consultation will minimize these potential challenges. If carried out appropriately, the aquaculture facility can become part of the landscape rather than transposed on the landscape. Addressing community engagement in siting of facilities is essential for gaining the social license to operate in the commons.

*f. Environmental performance and sustainability of seaweed aquaculture*

As seaweed is considered to be net-positive for the ecosystem, the controls in place and methodologies that demonstrate ecosystem services will be quantified and considered for use in the siting of farms. Some of the localized water quality effects of seaweed farming may help buffer coral reefs from acidification and seaweed barriers around coral reefs (not in them) may have greater value, especially if reef health is a key component to the economy. Additionally, being able to articulate environment impacts ? positive and negative ? will grow a more transparent relationship with farmers and communities.

*g. Investment and fund sources for scaling*

Lining up appropriate investments whether from aid communities, businesses, tax revenue, or philanthropy will help identify priority activities and how funds received will be spent in a corresponding manner to those priorities set. Funds will have restrictions on use and understanding these restrictions assists in planning for gap filling with other sources of funds.

*h. Training and education to support goals*

The overarching strategy will set out a vision for the end state of its successful implementation. Critical to the success is informing and educating those with the skills that will be necessary to achieve goals and objectives in the strategy is key, especially from the perspective of having a train-the-trainer mentality where high-end training of trainers results in lower-cost training of others. The goals and education to support them is a fundamental job of the government in support of a growing industry sector.

**Component 2: Shrimp feed and shrimp product connectivity**

***Outcome 2.1: A credible and functioning feed management system created, to connect shrimp feeds to shrimp products to satisfy growing international market demand (Indonesia) (\$ 1,900,000)***

For a feed to be tracked, traceability from processing plant to shrimp farms is necessary and will be addressed in the ADB baseline investment. However, the feed tracker that connects feed to shrimp products will require a greater depth of knowledge of the feed ingredients being used and their origins. A key element here will be the actual source of feed inputs from the ocean to the processing plant ? currently, an area that that *Output 2.1.3: Shrimp feed tracking system alongside the policy landscape of trash fish in Output 2.1.4.#2: will be able to illuminate, especially around the traceability and accountability of ?trash fish? and marine ingredients in shrimp feeds.*

This outcome is to enable transparent information collection and sharing. Agreement with the private sector and relevant government agencies will be required followed by workshops that help build the architecture of what a tracking system must convey. The protocol will be reviewed with the Seafood Task Force as industry representatives, to ensure credibility, validate information (including regulatory adherence) and address key requirements of the international buying community (primarily private sector).

This component builds on *Output 1.1.1: Indonesia - National Action Plan for Shrimp Aquaculture, Output 1.1.2: Marketing and business plan for renovated shrimp sector* Strategic advice and engagement with members of the Seafood Task Force (STF) as part of Output 4.2.1 pre and post project inspection by the Seafood Task Force. The majority of STF shrimp buyer members already have contracts with the major processing plants in Indonesia and so a shift to focus on issues in the Indonesian supply chains is

a natural progression of their scope and work. This engagement will provide stronger oversight to maintain and access new markets for the growth of Indonesia's farmed shrimp.

*Output 2.1.1: Indonesian government, feed and processing sectors trained on requirements to access markets of the Seafood Task Force (STF) (Indonesia) (2 convenings) (led by MMAF)*

To date, the STF represents the only broad industry alliance that is seeking to take on the challenges of decreasing risk in the feed supply chains for shrimp aquaculture. The STF's collective purchasing represents the bulk of the US market share for shrimp. The credibility and market oversight that the STF brings is an off-ramp for the project and the loan to ensure oversight of the supply chain complementing the national and regional policy changes to foster greater sustainability in feed ingredient supply chains.

The two convenings with the STF will demonstrate the buyer's attention to the issue of feed ingredients and traceability and sustainability. Further, it will be used to bring more attention to the challenges of feed more broadly in aquaculture and demonstrate the scale of this challenge. This output will work together with *Output 1.1.2: Marketing and business plan for renovated shrimp sector*.

Although this output will be directly overseen by KKP DGA and cooperation with BAPPENAS, the implementation will also coordinate with the KKP Directorate General Of Strengthening Competitiveness Of Marine And Fisheries Products - which is mandated with marketing and dealing with international markets, and the Directorate has a Director of Business and Marketing whose mandate is to consult with the private sector, key clients, and export players for the shrimp aquaculture market;

*Output 2.1.2: Mass balance inspection protocol to validate feed to shrimp tracking generated (Indonesia) (led by MMAF)*

Mass balance is the ability to check the incoming and outgoing feed products and represents the verification and validation necessary to have credibility in the oversight of the feed supply chains. Instituting mass balance checks on the feed will assist in minimizing fraud. The mass balance system will build on the guidelines laid out in the Aquaculture Stewardship Council Feed Standard<sup>[30]</sup><sup>30</sup> combined with the STF's experience in Thailand and tailored to the Indonesian setting and the role of MMAF and National Feed Certification systems.<sup>[31]</sup><sup>31</sup>.

The Mass balance protocol specifies requirements for all feed mill producers to have at the minimum the following: a) Marine ingredient sourcing policy; b) Contracts with approved suppliers of marine ingredients; c) Goods-in control for marine ingredients; d) Mass balance calculation; e) Mass balance product identification and sales; f) Management system requirements, this system applies to allow feed mills that do not currently have access to MSC-certified marine ingredients, which given low availability and prohibitive import costs is unlikely. This protocol will be used in workshops convened with the government and the Indonesian feed sector to identify challenges and work to overcome them.

Activities in this output will require careful coordination and integration with *Output 2.1.3: Shrimp feed to shrimp tracking system* and *Output 2.1.4: Five supply chain validation exercises* and *Output 5.1.3 Knowledge management and communications products*

*Output 2.1.3: Shrimp feed to shrimp tracking system developed. System requirements for feed to shrimp tracking co- created by Government and Industry, and supported by a roadmap and execution timeline ? with links to National Action Plans for Shrimp Aquaculture (Indonesia) (led by MMAF in cooperation with BAPPENAS)*

Shrimp feed to shrimp tracking system developed (linked to Outputs 1.1.1 and 1.1.2 above). Digitization of traceability information ? whether shrimp or feed ? requires capacity analyses for data volumes, but also data storage and data privacy. Determination of system requirements will also provide evidence to determine if a separate traceability system is necessary and different from the farmed shrimp traceability effort included in the ADB baseline investment.

A consultative process with key national business and government stakeholders will be conducted including STF. Once the technology solution is agreed upon, the two pilot feed mills in partnership with the project team and MMAF will draft minimum labelling guidelines for all imported and domestically produced fish meal and fish oil, to include: Manufacturer name and location where the batch was processed, fish species that make up the batch (common name in English and also the Latin name), link to fishing grounds (Indonesian Fishery Management Areas (FMAs)) for Indonesian fisheries.

The National Shrimp Feed Sourcing Specialist will be responsible for drafting the system requirements for feed-to-shrimp tracking co-created by Government and Industry and supported by a roadmap and execution timeline ? with links to the National Strategy for Shrimp Aquaculture (Output 1.1.1) to integrate the road map and execution timeline into the National Shrimp Aquaculture Plan and KKP Work plans and KPIs. The IT Specialist will, among other things, produce an operations and maintenance manual in coordination with the Knowledge Management specialist leading Output 5.1.3 Knowledge management and communication products.

Work under this output benefits from Outputs 1.1.1 and 1.1.2 ? with a focus on the development of the corresponding IT system.

*Output 2.1.4: Five supply chain validation exercises to refine and improve feed to shrimp tracking system supported (Indonesia)*

#1 Policy and Regulatory Improvements In Feed To Shrimp Connectivity. (led by BAPPENAS)

Conduct a review of the institutional and policy landscape around the supply and use of fish meal and fish oil (FMFO) to the shrimp feed industry. This will benefit from initial work undertaken under the strategy and action plan and involve a review of government oversight of the shrimp feed industry, particularly the fisheries supplying fish meals. Propose a definition of ?trash fish? in Indonesian legislation and identify the government agencies responsible for tracking and validating sources of shrimp feed for adoption by the Government. This output will work closely with output 1.1.1 (National Shrimp Plan) and outputs 2.1.4

#2 (Traceability and accountability of ?trash fish? and marine ingredients in shrimp feeds).

Conduct an Institutional and policy landscape to produce a policy document to cover:

- i. The legal and institutional framework applicable to shrimp feed ingredients through the entire production shrimp feed supply chain. Support a subsidy analysis that will assess the impacts of harmful subsidies and provide recommendations for the introduction of net nature-positive incentives with respect to ?trash fish? labeling and oversight of the feed to the shrimp supply chain.
- ii. Provide a baseline on the corporate, government, legal and jurisdictional characteristics of all aspects of shrimp feeds and the supply of ingredients on which they depend.
- iii. Review the National Feed Development Strategy and Policies overseeing shrimp feed production, including a review of the role of the different directorate generals of MMAF, roles and responsibilities, quality control, monitoring and surveillance of feed production, testing and certification of shrimp feed, development of national feed standard, technical certificate issuance and national fish feed manufacturing standards.
- iv. Identify key project stakeholders the Government agencies, Industry representatives, and associations that will be engaged as part of a country-wide consultation throughout the project preparation implementation, taking the review and baseline information into account and producing a recommendation in coordination with The Directorate General of Aquaculture (DGA) Convene an

interagency / intersectoral task force (Government, CSO, Academia, Regional Organizations, Private Sector) on feeds to bring together various stakeholders that will support engagement across industry representatives.

v. Look at current feed testing processes, testing laboratories, and sampling regimes of MMAF for shrimp feeds. Identify opportunities to enhance transparency, by facilitating registration of feed suppliers, farms, aggregators, and processors into the INDOGAP system and review opportunities to seamlessly integrate the shrimp feed supply system into the National Fish Traceability and Stock System (STELINA) led by the Director General of Product Competitiveness of the MMAF to accommodate and comply with international market requirements (including the United States Seafood Import Monitoring Program (SIMP) and the European Union (EU) regulations as well as recent Import regulations in Japan which aim to combat Illegal, Unreported and Unregulated (IUU) fishing and ensure food safety and coordinate with *Output 1.1.2: Marketing and business plan*.

## #2 Traceability and Accountability Of ?Trash Fish? And Marine Ingredients In Shrimp Feeds. (led by MMAF)

This sub-project will attempt to approach a definition of ?trash fish? and introduce a system to track, trace, and account for the use of trash fish in (FMFO produced domestically and imported into Indonesia). It will also track, trace and document a subsample of fishing boats which supply trash fish to the meal industry at identified landing sites, identify the fishing gears in use, geographical locations, species collected, buyers, and suppliers. Building on the results, opportunities to improve the labeling and traceability of shrimp feeds, both from a policy / regulatory perspective, and through industry-led initiatives (through collaboration with Seafood Task Force and others will be explored under Output 4.1 (Pre and Post project inspection) and Output 4.2.2 Feed/Shrimp tracking program action plan communicated).

Conduct an inventory of all imported and domestically produced fish meal and fish oil:

- i. Conduct a landscape assessment of all sources, fisheries, gears, and fishing grounds of trash fish from Indonesia, for both individually caught species and those emanating from mixed fisheries. Identify a list of species caught and used (and where necessary conduct DNA analysis to confirm species). Produce a trash fish inventory that looks at each species used in trash fish and the fishing gears used and identify competing for human food uses and Endangered, Threatened, and Protected (ETP) species.
- ii. Conduct a policy review in partnership with the Directorate General of Aquaculture on a country-wide definition of ?trash fish?, including recognition of its uses, and sources (fishing gears, boats, fishing grounds, and creating a list of the species captured). Guidelines for business registration and accreditation of ?trash fish? traders will be considered by the Policy Advisor on Trash Fish. Business registration of trash fish traders will improve the traceability and documentation of products in the feed to the shrimp supply chain. Other opportunities to enhance traceability may include an addition to KKP Fishing licenses to track fishing vessels and gears, their fishing grounds, and landing ports that supply ?trash fish for shrimp feeds.
- iii. Work with the seafood task force to devise a credible third-party traceability system for tracing fish meal and fish oil used in shrimp feeds
- iv. In partnership with the Seafood Task Force, draft minimum labeling guidelines for all imported and domestically produced fish meal and fish oil, to include: Manufacturer name and location where the batch was processed, fish species that make up the batch (common name in English and also the Latin name), link to fishing grounds (Indonesian Fishery management Areas (FMAs)) for Indonesian fisheries.
- v. Design a mass balance inspection protocol and lay out a policy document to track all ingredients in shrimp feeds. Test out inspection protocol in partnership with Seafood Task Force. Identify best practices for transparency and public disclosure requirements for feed mill producers in Indonesia and minimum requirements for importing. Look to already developed systems such as Republic Systems ?TransparenC? to track the supply chain of shrimp feeds

### #3 Innovative, Cost-Effective, And Functional Shrimp Feeds. (led by MMAF)

The main aim will be to explore options for alternative feed ingredients which could replace, offset or reduce the marine ingredients in FMFO and overall shrimp feed formulations; and improve the overall quality and functionality of shrimp feeds for feasible economic scale production. One option discussed was the use of insect meal (e.g. black soldier fly larvae). This work will need to consider shrimp feed palatability, digestibility, and current production levels. There may also be opportunities for potential investments in emerging enterprises in this specialized field, for example through ADB private sector operations, or associated investment funds such as Aqua-Spark ([www.aqua-spark.nl](http://www.aqua-spark.nl)).

Conduct an initial audit/baseline of marine ingredients in use in all commercially available shrimp feeds. Through a third-party lab certified lab evaluate the composition of essential amino acids, minerals, phospholipids, and fatty acids meal, fish protein hydrolysate (FPH), ash, fish oil, fish protein concentrates and) and other ingredients in all imported and domestically produced fish meal, fish oil and shrimp feeds. Include a comprehensive analysis of fish DNA to confirm the presence of species of trash fish (if the protein has not been too degraded during the fish meal production process) to identify species included in the trade and all ingredients in use in shrimp feeds.

Conduct a consultation workshop on all potential experimental feeds for shrimp feed in partnership with academic institutions, regional entities like SEAFDEC Aquaculture, Network of Aquaculture Centers (NACA), WorldFish Center, paying particular attention to Indonesian-based universities, fisheries and aquaculture polytechnics (Bogor Institute and others).

Identify ongoing initiatives around feeds such as insects and plant feeds, the use of yeast and bacteria, and fermentation of feeds that offer the potential for replacing the use of trash fish. Identify at least two priority feed products and support their prototyping activities in partnership with MMAF

Based on the results of the prototypes, establish a private sector forum to explore opportunities for private-public partnerships on feed development in Indonesia. Outputs to include potential partnerships for collaboration with output 2.1.4 #4 sustainable financing for feed. Corresponding research and development agendas could also explore private sector engagement to undertake 'pre-competitive research' in collaboration with Blue Innovation and ADB's private sector financing unit amongst other interested parties. This could include a multi-stakeholder panel to refine a key aspect which will be financial modeling and comparative analysis of current fishmeal practices vs alternatives, in coordination with output 2.1.4 #4.

In coordination with MMAF and local and international research institutions and universities, NGOs and small and medium enterprises, prepare terms of reference and solicit a number of research and development proposals on alternative feed sources. This cutting-edge work would focus on new pilot innovative alternative protein sources to fish meal; and aligned with ADB's prior and ongoing work within the Private Sector Operations Department (PSOD). Efforts to link promising results to downstream bridge or pre-commercial / commercialization financing will also be considered.

In addition to the proposed framework for disincentivizing unsustainable sources of feeds and incentives for nature positive feeds and the pilot research and development initiatives, develop a sustainable financing mechanism for shrimp feeds to leverage private sector support and funding, this will include policy and financial incentives for the use of non-trash fish alternative sources of protein and disincentives for the use of and import of fish Meal and Fish Oil into Indonesia, especially from countries considered as high risk for IUU fishing and human and labor right abuses.

Engage an accredited research institution to conduct independent laboratory analysis of available feeds. Conduct workshops to bring together shrimp farmers with research institutes and other stakeholders, design of R&D agenda, support for network development (e.g. FAO, ADB PSOD, Network of Aquaculture Centres in Asia, universities, companies engaged in feed alternatives, etc) pre-competitive research and possible small grants program for universities/research institutes. Knowledge management work related to feeding alternatives.

#### #4 Sustainable Financing For Feed To Shrimp Connectivity And Products. (jointly implemented MMAF and BAPPENAS)

There is a need to find ways for key stakeholders notably, fishing vessels/owners, suppliers of fish meal fish oil and other feed ingredients, shrimp feed producers, shrimp farmers, and others to be incentivized to change current behaviors and practices which are harmful to the environment.

A consultant will look at supporting different financing structures, such as trust funds to accelerate the transition away from unsustainable feed sources. One potential opportunity is the Lembaga Pengelola Modal Usaha Kelautan dan Perikanan (LPMUKP) ([www.blupmukp.id](http://www.blupmukp.id)) within KKP, which may be an appropriate vehicle to create a sub-fund dedicated to encouraging shrimp feed traceability and catalyze a shift to more sustainable and conversion free approaches. Work can look at opportunities to design of a sub-fund, defining key areas and selection criteria for funding (including fund governance mechanism) and resource mobilization or 'crowding in' of finance.

Building on the policy landscape and review of subsidies (Output 2.4.1 #1 and 2.4.1. # 2) conduct a deeper study on the 'true costs' of the use of fish meal and fish oil in the shrimp feed sector. One such example could be to explore financial disincentives for the use of trash fish. This work will include calculating the hidden costs of the use of trash fish. Options for capturing these costs would be explored as how to use these to incentivize the development of alternative feed sources and ultimately the replacement of fish meal and fish oil in shrimp feeds. Opportunities to support the development of feeds with nature-positive characteristics and innovative uses of locally available resources such as palm oil kernel can also be explored as part of this work.

In addition to the proposed framework for disincentivizing unsustainable sources of feeds and incentives for nature positive feeds, develop a sustainable financing mechanism for shrimp feeds to leverage private sector support and funding, this should include policy and financial incentives for the use of non-trash fish alternative sources of protein and disincentives for the use of and import of fish Meal and Fish Oil into Indonesia, especially from countries considered as high risk for IUU fishing and human and labor right abuses.

#### #5 Digital Technology And Other Applications For Feed To Shrimp Connectivity And Products. (led by MMAF)

Activities considered under this sub-project will mostly focus on the testing and installation of full traceability systems of the marine ingredients supplied to make shrimp feed in at least two feed mills. Other activities under this outcome include support for one learning forum to encourage farmers and industry partners to share solutions that increase opportunities for traceability, tracking, operational improvements (e.g. oxygenation), data collection and processing, disease management, water quality management, renewable energy sources, etc. This work will be aligned with the activities in the loan project related to STELINA and MMAF traceability system.

Design and launch a learning forum within the shrimp feed validation exercises (under this output) to document and track 'best practices' in pond management, reducing shrimp feed use and wastage, improving food conversion ratios, reducing disease and improving pond management and improving the overall efficiency of the production systems. Process document and produce a manual of best practices and series of videos available to shrimp pond owners. Include opportunities to leverage different hardware and software as a service for feeding, tracking oxygen and overall shrimp management. Opportunity to leverage the ADB loan by identifying innovations and leader farmers for supporting research and innovations in their own farms and farming practices.

GEF Support to Activities:

Consulting services to promote digitization. Workshops, meetings, conference participation. Inclusion of gender analysis to support innovation (across multiple outputs). Knowledge management work.

### **Component 3: Amplification of seaweed aquaculture**

#### ***Outcome 3.1: Seaweed aquaculture and capture of nutrients from the ocean expanded (Timor-Leste) (\$40,150)***

Seaweed aquaculture has attributes that create the opportunity for climate change gains in ocean ecosystems. The literature is not concise on the various rates of nutrient uptake across a wide variety of environments, and it is important that if seaweed aquaculture is to be used as a mitigation mechanism to halt some nutrient pollution and ocean acidification these processes are measured and tested appropriately. Expanding seaweed aquaculture is critical to realize scaled ecosystem service benefits.

##### *Output 3.1.1: Blue carbon credit payment agreements facilitated for seaweed ecosystem services.*

Green carbon credit payments for forestry have already been initiated in Timor-Leste and there is now interest in extending to include blue carbon credits for seaweed, sea grass and mangrove. Local Foundations such as One Seed and COTI are facilitating the brokerage of forestry carbon credits in Timor Leste. Partnerships will be sought with these local Foundations to facilitate ecosystem payments to seaweed farmers which could also be expanded to managing mangrove and seagrass beds under EAA and Marine Management Plans.

An ecosystems services specialist will be recruited to prepare a manual describing the methodology for quantifying ecosystem services. This manual will then be used for training in the workshops described under Output 3.1.2.

##### *Output 3.1.2: Workshops conducted to develop/implement outputs 1.2.1 and 3.1.1, including: representation across key ministries and involvement of relevant private sector players.*

The implementation of national strategies and the understanding of ecosystem services will require workshops that include multiple ministries such as the Ministry of Agriculture and Fisheries (MAF), the Ministry of Tourism, Commerce and Industry (MTCI), the Ministry of Planning and Territory; the Secretary of State for Environment. These workshops will also provide a foundation for the inclusion of private sector market actors to be exposed to the plans and opportunities for seaweed cultivation in Timor-Leste. Further, by demonstrating these opportunities and the volume demand, it will increase the case for functioning cooperatives that can pool volume leverage for diversified opportunities in seaweed value chains.

Three workshops will be held to prepare the national seaweed strategy ? i) to prepare the baseline for the strategy, ii) to prepare the strategy and iii) to validate and endorse the strategy.

Three workshops will be held to facilitate the quantification and roll out of blue carbon credits. The first workshop will be with seaweed farmer representatives to inform them of the requirements to become eligible for ecosystem service payments. The second workshop will be with relevant Government representatives to explain how the blue carbon credit works and potential opportunities in Timor Leste. The third workshop will be a match making event between seaweed farmer representatives, local Government authorities and the carbon credit brokers/Foundations.

##### *Output 3.1.3: Policy and regulatory gap framework analysis from GEF 7 Blue Horizon project adopted and applied to Timor-Leste to generate policy recommendations including zoning, mooring, prevention of marine mammal entanglements, carrying capacity*



A policy and regulatory gap framework will be developed under the GEF 7 Blue Horizon project. These analyses will help determine zoning requirements, carrying capacity, and livelihoods potential under the EAAs to be carried out under Output 3.2.1 because the Blue Horizon project is addressing near shore and non-near shore environments the policy and regulatory gap framework will be comprehensive and will provide the bulk of the methodologies that Timor-Leste can use to determine its own gaps in policy and regulation. Through the policy and regulatory gap analysis, specific recommendations for safeguards and policies for seaweed aquaculture will be advanced for regulatory consideration. The specific collaborations with this project will be to 1) improve the health of the marine environment by reducing the amount of excess nutrients in the water 2) capturing carbon dioxide 3) encouraging economic development and diversification in the local community by creating sustainable and forward-thinking jobs 4) provide a regenerative input for a variety of industry products (i.e. animal feed, textiles, bioplastics, etc.). The expanded knowledge that beneficiaries will receive from the collaboration with the Blue Horizon project will be a demonstration in synergy creation.

A seaweed policy and regulatory gap consultant will be recruited to prepare a report that will inform the preparation of the wider National Aquaculture Seaweed Strategy and implementation of EAAs. A local gender specialist will also be recruited to provide inputs on gender equality in seaweed farming.

The GE7 Blue Horizon project in Viet Nam will carry out a full assessment of what regulations may be needed to suitably implement the seaweed strategies to optimize impact. Priority policy gaps and needs will be identified and described, including barriers to market expansion, capabilities for and constraints to enforcement, and gaps in human and financial resources. Specific recommendations for guidelines and additional measures to address the gaps and barriers will be developed. Based on these, new legal instruments will be drafted. In addition, voluntary measures and best practices for the seaweed industry will be identified. Based upon experiences in Viet Nam, the regulatory gap framework analysis will be applied in Timor-Leste.

***Outcome 3.2: Seaweed farmers increase production and adopt sustainable seaweed production techniques (\$859,850)***

***Output 3.2.1: Sustainable marine resource management and planning demonstrated in Atauro and Metinaro (Timor-Leste)***

The Ecosystems Approach to Aquaculture (EAA) is being piloted by FAO in Metinaro and Boboraro. EAA is a strategy for the integration of seaweed cultivation (and other aquaculture activities) within the wider ecosystem such that it promotes sustainable development, equity, and resilience of interlinked social-ecological systems. The EAA requires an appropriate policy framework under which the strategy develops through several steps: (i) the scoping and definition of ecosystem boundaries and stakeholder identification; (ii) identification of the main issues; (iii) prioritization of the issues; (iv) definition of operational objectives; (v) elaboration of an implementation plan; (vi) the corresponding implementation process, which includes reinforcing, monitoring and evaluation; and (vii) a long-term policy review. EAAs may also be part of a larger plan for a Marine Protected Area

The EAA will be demonstrated in six pilot sites where such an approach is a priority due to unsustainable or conflicting use of the marine resource and in areas where improved production and post-handling techniques are also being demonstrated. NDFA staff will be trained in EAA, enabling them to lead the process in the municipalities.

The six pilot sites will be located in Atauro, Ulmera (Bazartete, Liqui? a municipality), Manuleu (Sabuli, Metinaro municipality) and Biacou (Aidabalaten, Atabae, Bobonaro municipality), where most seaweed is currently cultivated. Areas where conflict amongst resource users is more likely to occur, such as in Biacou, will be prioritized.

Prior to carrying out the EAA, the EAA concept will be socialized with stakeholders such as relevant government agencies, local administrations, other marine users and seaweed farmer representatives. A

pre-assessment will also be conducted to define potential seaweed farming areas and observe the multiple marine uses and users. Measurements of water quality parameters will be taken in and outside the area as baseline control.

*Output 3.2.2: Improved production and post-harvest handling techniques demonstrated in Atauro and Metinaro*

Improved production techniques include methods to increase productivity such as the introduction of new cultivars or practices to reduce losses from diseases such as ice-ice or techniques to expand production areas. As women carry out most of the tasks cultivating seaweed, gender aspects will be considered for all techniques being demonstrated.

A seed nursery will be established to test the suitability of new cultivars, which will likely be imported from Indonesia. The nursery will be managed by NDFA and located at the National Institute of Fisheries and Aquaculture in Liqui?a. Suitable cultivars can then be distributed to farmer groups for propagation and wider distribution. A program of capacity building will also be developed for NDFA enabling them to continue supporting the growth of the seaweed sector into the future.

In areas where the shorelines are already full of seaweed cultivation, the floating-raft and tubular net methods will be demonstrated which are suitable for cultivation in deeper waters. Seaweed cultivation in deep waters requires the use of canoes and poses a higher risk of drowning, which needs to be considered, especially for women.

Key aspects of post-harvest handling are moisture content and contamination. The use of ?Para-Para? drying racks will be demonstrated to reduce contamination from sand and dirt and solar dryers piloted for use in the rainy season. Floating seaweed dryers can also be integrated into floating-rafts to reduce the effort required to transport fresh seaweed to store and keep the seaweed clean. Improved storage will be supported through farmer groups, as described under Output 4.1.1 below.

A specialist training organisation will be contracted to provide the farmer-based training in the six sites where EAAs have been completed.. The six pilot sites will be located in Atauro, Ulmera (Bazartete, Liqui?a municipality), Manuleu (Sabuli, Metinaro municipality) and Biacou (Aidabalaten, Atabae, Bobonaro municipality), where most seaweed is currently cultivated. Areas where conflict amongst resource users is more likely to occur, such as in Biacou, will be prioritized.

The EAA approach includes several steps: (i) the scoping and definition of ecosystem boundaries and stakeholder identification; (ii) identification of the main issues; (iii) prioritization of the issues; (iv) definition of operational objectives; (v) elaboration of an implementation plan; (vi) the corresponding implementation process, which includes reinforcing, monitoring and evaluation; and (vii) a long term policy review.

It is expected 50 farmers in each site will complete the training and receive some inputs to establish seaweed beds, equivalent to 50 lines of seaweed each, which totals 6.25ha in each site.

As the sector grows there will be an increasing need for the private sector to provide support services; such as input supply, financial services, technical advice, transport, processing, etc. A programme of capacity building will also be developed for such private sector support services to prepare them for this.

**Component 4: Improved market linkages**

Due to the small volume of seaweed production in Timor-Leste, farmers are reliant on international RDS buyers sending a boat to collect the seaweed off Atauro or a small number of Timorese exporters to export seaweed through the Dili container port. Managing international sale contracts and export

procedures is a challenge for farmer groups and the current end market is limited to carrageenan. Capacity building will be provided to farmer groups to increase the number and diversity of RDS buyers in Timor-Leste.

***Outcome 4.1: Timor-Leste Seaweed farmer groups engage with more diverse markets (\$174,542)***

**Output 4.1.1: Seaweed farmer groups strengthened to aggregate and store RDS**

Seaweed is cultivated on a household basis with many individual household outputs averaging only 100 kg every 50 days. As such, aggregation into marketable volumes is a prerequisite to linking with markets. As it can take several months to aggregate enough seaweed to make a shipment, a warehouse for storage is also required. Depending on the size and capacity of the farmer group, farmer group leaders can negotiate export contracts directly with overseas buyers, or sell to a larger aggregator in Timor-Leste.

Support will be provided to train seaweed farmers in organizational skills to become viable aggregation groups and build storage warehousing and shared drying racks. Training will target both men and women (see Gender Action Plan).

**Output 4.1.2: Traders and seaweed farmer group leaders trained in contract brokerage and export procedures**

If traders and farmer group leaders are going to engage with overseas buyers, they will need to negotiate international supply of goods agreements and comply with export/import requirements. With the support of legal advisors and Trade Invest (Timor-Leste's export promotion agency), traders and farmer group leaders will be trained in establishing an export enterprise and complying with export procedures. Training will target both men and women (see Gender Action Plan).

**Output 4.1.3: Seaweed traders and farmer group leaders network with international buyers**

There are at least two networking hubs that will expose seaweed stakeholders in Timor-Leste to international buyers. The Safe Seaweed Coalition (SSC) is a global partnership established to oversee the safety and sustainability of the seaweed industry. As the Coalition develops, its members will represent the entire seaweed value chain ? from smallholder farmers to multinational businesses, specialized research institutes to intergovernmental organizations ? working together to realize the full potential of the seaweed industry and to ensure its safety for consumers, for workers, and for the environment.

*Jaringan Sumber Daya Teknologi dan Informasi Rumput Laut (JaSuDa)* is a seaweed data and information network spread across eastern Indonesia. JaSuDa continues to be developed into a social enterprise that focuses on empowering vulnerable coastal communities, especially to improve the welfare and independence of seaweed farmers in gaining access to information, finance, markets, and technology.

JaSuDa provides services to help farmers develop sustainable seaplant resources, supporting micro, small and medium enterprises (MSMEs) to produce value-added products and connecting MSMEs to end users in a transparent manner. JaSuDa focuses on cultivation, a sustainable value chain with modern IT, and building strategic business alliances. JaSuDa's products and services continuously collect data on seaweed prices, conduct intensive and periodic research and provide technical assistance and capacity building for MSMEs.

Seaweed traders and seaweed farmer group leaders will be supported to participate in network hubs such as SSC and JaSuDa and make use of market information services provided by them.

*Output 4.1.4: Expanded collaboration through 3 workshops with GEF 7 Blue Horizon seaweed aquaculture project participants (Timor-Leste)*

The workshops with the GEF 7 Blue Horizon project will allow for lessons learned and sharing across major production areas of seaweed. The challenges of the seaweed sector in Timor-Leste being in its infancy can be aided by key milestones identified in other countries and how many challenges were overcome. The Blue Horizon project will bring buyers to the region for exploration in purchasing products, thus we are proposing a target of 2 off-take agreements from private sector actors through this cross-collaboration. Additionally, green/blue financing and carbon market trends will be shared as well as the potential for more non-near shore seaweed production in the future for Timor-Leste.

***Outcome 4.2: Engagement of Indonesian shrimp industry leadership/associations with the Seafood Task Force (STF) (\$275,000)***

The STF is a membership-based trade organization that is composed of commercial members that are owners of farmed shrimp supply chains (farm to a processing plant) and feed supply chains (feed ingredients to feed manufacturers) as well as tuna supply chains. Business members include Costco Wholesale Corporation, Sodexo, Sysco, Wal-Mart, Target, CP Foods, Thai Union, Thai Royal Frozen, Marine Gold, Kingfisher, Bumblebee, Chicken of the Sea, Nestle, Mars, and other companies. Other members include International and national NGOs such as WWF, International standards setting bodies such as the Marine Stewardship Council. The Aquaculture Stewardship Council, the MarinTrust, and other partners. The approach adopted within the STF in Thailand has been to take a systems approach and provide full supply chain oversight rather than the model of certifying each node of the supply chains. The majority of STF shrimp buyer members already have contracts with the major processing plants in Indonesia and so a shift to focus on issues in the Indonesian supply chains is a natural progression of their scope and work. This engagement will provide stronger oversight to maintain and access new markets for the growth of Indonesia's farmed shrimp. Empowering the associations in Indonesia to engage with the STF will allow for first-hand knowledge and understanding of buyers' desires for greater accountability in the feed ingredients supply chains that link to their purchases of shrimp. This will create and strengthen conditions for improved shrimp export performance, throughout the value chain (from shrimp pond owners and managers, through to buyers, exporters, importers and ultimately end user restaurants, food service companies and consumers). There is a need to ensure alignment between industry and the Government of Indonesia policies, guidelines and implementation and bring Indonesia's shrimp feed and its traceability, human and labor, rights and food safety to a par with those in place in Thailand and with global best practices and standards.

*Output 4.2.1: Pre- and post-project inspection by the Seafood Task Force (STF) to understand STF requirements and confirm requirements have been met (Indonesia) (led by MMAF in cooperation with BAPPENAS)*

As this project is to take on one of the key challenges that the STF has taken on in Thailand, the shrimp feed tracker will require inspection for efficacy by international market actors. The STF is the only industry group that is providing this oversight and it is expected that the Indonesian shrimp sector taking it upon themselves to create an aligned version of the work developed in Thailand will help provide a welcoming environment for the STF expansion.

*Output 4.2.2: Feed/shrimp tracking program action plan communicated / socialized and implemented at project sites (Indonesia) (led by MMAF)*

The MMAF in partnership with the STF will contract a small team of independent consultants to develop, test, and validate a mass balance protocol system for at least two early adopter feed mills. The consultants will work across the whole feed supply and trace all feed ingredients sourced. Each source of ingredients will be verified and documented along with the development of appropriate sourcing guides for future supplies. The work will also include engagement with the suppliers. Results of the first pilots will be shared with the STF members incrementally.

To adopt the Mass balance protocol all feed mill producers will have at the minimum the following: a) Marine ingredient sourcing policy; b) Contracts with approved suppliers of marine ingredients; c) Goods-in control for marine ingredients; d) Mass balance calculation; e) Mass balance product identification and sales; f) Management system requirements to check the incoming and outgoing feed products and represents the verification and validation necessary to have credibility in the oversight of the feed supply chains.

The mass balance system will build on the guidelines laid out in the Aquaculture Stewardship Council Feed Standard [34]32 combined with the STF's experience in Thailand and tailored to the Indonesian setting and the role of MMAF and National Feed Certification systems such as the Indonesia Good Aquaculture Practice (IndoGAP). This protocol will be used in workshops convened with the government and the Indonesian feed sector to identify challenges and work to overcome them. It is expected that the mass balance protocol system will be adopted by the STF for use by all members.

The MMAF will then work with the STF to integrate the system into the MMAF STELINA system (or other viable systems) to develop a fully functional feed/shrimp tracking system supported by government policies with the appropriate third-party evaluation system integral to the system.

Opportunities to continue to engage the feed source suppliers will also be explored, including but not limited to the accreditation of their products as part of the IndoGAP, MMAF STELINA system, and MMAF DGA policies. The whole process will be documented and the early adopters' case studies showcased as knowledge products and best practices in shrimp feed supply.

*Output 4.2.3: Supply chain renovations of shrimp traceability, broodstock, and hatchery facilities, controlled intensification of farms, and product quality and safety controls demonstrated in 5 buyer visits to renovated sites will inform business and marketing plans for greater market access. (led by MMAF in cooperation with BAPPENAS)*

The MMAF / STF endorsed supply chain system (STELINA supported) will then be scaled to five pilot sites and tracked over time to ensure alignment with the protocol and guided by third party entities. With the implementation of the feed/shrimp tracker, the shrimp industry will be able to convey how renovations, policies, and actions plans have made the sector more robust and better equipped to deal with changing and challenging market forces. The ADB loan execution will result in numerous changes that will support a forward leaning industry that can be showcased to international buyers.

### **Component 5: Knowledge Management and IW Learn (regional)**

#### ***Outcome 5.1: Knowledge management including participation in IW: LEARN (\$345,000)***

To solidify lessons learned, new opportunities, and how to communicate and manage such knowledge, the project will support stakeholders in sharing of project outcomes, challenges and solutions and the overall case that interventions have positive outcomes. Note that 1% of the GEF financing has been budgeted for IW:LEARN-related activities.

*Output 5.1.1: Participation in IW: LEARN regional meetings, GEF Biennial International Waters Conference (IWC), and East Asian Seas (EAS) Congress (Indonesia and Timor-Leste)*

Because the GEF grant-making process requires a great depth and breadth of understanding, it is critical to demonstrate how the GEF operates across water bodies and countries and across different thematic areas. Opportunities to share experiences, and the various knowledge products to help identify new solutions and scaling opportunities beyond Indonesia. Key stakeholders will provide inputs for IW:LEARN including contributions to web-presence, experience notes, and participation in IWC and other events.

---

*Output 5.1.2 Sharing of good practice across GEF-supported LME / regional seas programmes such as but not limited to in Asia and the Pacific, including ISLME, Gulf of Thailand (GOT), Bay of Bengal (BOBLME), Sulu Celebes Sea (SCS), ATSEA, Yellow Sea LME, and others ? with focus on SAP implementation (implementation by BAPPENAS, MMAF and MAF)*

In collaboration with the secretariats, coordinating bodies and implementing agencies of the various GEF-supported LME / regional seas programmes, the project will support a series of knowledge events (e.g. webinars, engagement during international conferences, etc) to share good practice on shrimp feed supply as well as seaweed aquaculture.

Indonesia's shrimp industry is growing at a significant pace which is in turn fueling a significant demand for shrimp feed that has largely grown somewhat under the radar. The project will be looking at a variety of approaches to minimize the harmful impacts of the feed supply across five supply chains and two model feed mills. The experiences from these pilots will provide a variety of knowledge products that will be shared as outputs of the project. The work on shrimp in Indonesia will produce a series of knowledge products as part of the work (see *Knowledge Management* section above).

*Output 5.1.3 Knowledge management (For more details See Section 8 ?Knowledge Management Strategy?) and communications products, such as i) implementing the Environmental Approach to Aquaculture in Timor-Leste, private sector engagement, the feasibility of carbon markets, supply-demand models for different seaweed products for Timor-Leste, and ii) At least 15 knowledge products that provide Lessons on aquaculture policy and strategic directions for Indonesia ? with the inclusion of improved tracking of feed through shrimp aquaculture supply chains, iii) Other types of technical reports and assessments and a Community of practice for the Indonesia shrimp feed mills sector. (implementation by MMAF, BAPPENAS and MAF). (BAPPENAS lead on Knowledge Management Strategy in Indonesia)*

Indonesia's shrimp industry is growing at a significant pace which is in turn fueling a significant demand for shrimp feed that has largely grown somewhat under the radar. The project will be looking at a variety of approaches to minimize the harmful impacts of the feed supply across five supply chains and with two feedmills. The experiences from these pilots will provide a variety of knowledge products that will be shared as outputs of the project. The work on shrimp in Indonesia will produce a series of 15 knowledge products as part of the work (see *Knowledge Management* section).

Timor-Leste has a nascent aquaculture industry and there is a significant opportunity to improve knowledge management between Timor-Leste and Indonesia in different states of development. It is beginning at slow increments. Indonesia, however, has a long history with aquaculture development with multiple large development bank projects to initiate an industry and copious amounts of private sector investment to maintain it. Nevertheless, mistakes have been made in Indonesia despite best intentions and Indonesia seeks to have lessons fully learned from their challenges shared with colleagues in adjacent countries and particularly Timor-Leste at such an early stage in development. Additionally, Indonesia can share the development story of the seaweed sector (for example through pilot activities in Bali under the COREMAP-CTI project) and how certain aspects and contingencies put in place, in hindsight, could have made a better business and livelihood option for the Indonesians. Knowledge management will likely be somewhat lop-sided for this proposed project because the histories of each country in aquaculture development are drastically different, but the lessons from Indonesia are critical to be heard and understood by officials in Timor-Leste.

Providing a broader audience with the improvements made in supply chains will foster greater access to markets and greater opportunities to develop new approaches that provide greater value and lower environmental footprint. This vital component of knowledge management requires an industry facing approach for the lessons learned to be taken up by similar aquaculture sectors in other parts of the world

and also to reach global food supply chains in countries where the majority of the demand comes from (Europe and the US).

Five representatives from Timor-Leste will attend these meetings. Representatives from NDFA responsible for policy making, technical specialists, and key private sector partners will be included in the delegation.

## **Outcome 6: Monitoring and Evaluation Plan implemented**

Outputs 6.1 Mid-term Review and Terminal Evaluation conducted. (\$100,000)

### **Alignment with GEF focal area and/or Impact Program strategies**

The proposed project is aligned with the GEF Focal Area on International Waters. Through greater transparency on feed ingredients, and interventions to control the type and source of marine ingredients in shrimp feed in Indonesia, this project will create the conditions to (1) restrict what fisheries from the ISLME and beyond can be used in shrimp feeds, thus reducing IUU and over-exploited fisheries, while in Timor-Leste the project will support greater value generation of seaweed farmers to expand production and create (2) nutrient pollution remediation through phosphorus and nitrogen capture, and (3) carbon sequestration to reduce ocean acidification. Both the Indonesian and Timor Leste theories of change directly support the outputs of the ISLME Theory of Change (see Appendix /Roadmap and introductory section of Alternative Scenario).

The project will directly support the below International Waters Focal Area objectives:

*Objective IW-1-1: Strengthen blue economy opportunities through sustainable healthy coastal and marine ecosystems*

This project will work closely with the private sector, communities, and government agencies to support reforms in feed ingredient accountability which will assist in decreasing the number of over-exploited fisheries used in shrimp feed. It will enable the participation of the private sector, particularly the feed companies, Seafood Task Force, Safe Seaweed Coalition, and small-scale farmers, as agents of scaling?. This will be done through direct engagement between Government and Industry through various means.

*Objective IW 1-2: Strengthen blue economies through catalyzing sustainable fisheries management*

The main focus of the project will be to address issues related to ecosystem integrity, food security, and poverty reduction in the candidate areas. It is aligned with investments which target sustainable practices in the fisheries sector, and internalization of priorities in respective national strategies. In Indonesia it will directly address innovation related to fishmeal and oils; and in Timor-Leste on cost effective nutrient pollution remediation and carbon sequestration. In both countries, given the links to the global supply chain, there will be direct engagement with the private sector. Efforts will be aimed at altering the trajectory towards sustainable and conversion-free aquaculture through market mechanisms, standard setting, improving ecosystem health, and addressing incentives which are detrimental to nature-positive approaches.

*Objective IW-1-3: Strengthen blue economy opportunities by addressing pollution reduction in marine environments.*

Overall, the project will strengthen blue economy opportunities while also addressing pollution reduction in Timor-Leste. Seaweed captures nitrogen, phosphorus, and carbon which helps reverse and prevent eutrophication, supporting local and global ocean health.

### **Incremental/additional cost reasoning and expected contributions from the baseline**

There is increasing attention being paid to the future and potential benefits of Blue Food, globally. Aquaculture is expected to play a large role in providing these benefits including, low-footprint food, better livelihoods, less habitat conversion, etc. It is important for the future of aquaculture for the 'good' to be promoted and the 'bad' to be mitigated. Moreover, at a time of heightened attention on the positive attributes of aquaculture such as seaweed or mussels, the aquaculture feed sector is growing more rapidly. The fundamental challenge of making aquaculture more sustainable begins with knowing 'knowing how things are produced, who produced them, and what are the implications of their production. At the present, we know very little about the feed. The beneficial aspects of feed are that it can be a much better nutrient delivery system for animals and feed manufacturing utilizes many by-products or co-products of other food and beverage sectors that might otherwise be discarded. The aspects that we don't know seem to trickle out in alarming stories 'forced labour in the soy sector, forced labour in the fishing sector, loss of ecosystem services from the clearing of intact ecosystems, overfishing and indiscriminate fishing, IUU fishing, contaminants such as plastics and other chemicals that may harm the culture animals or the humans that consume them, etc.

Under the business as usual (BAU) it is expected that the current harmful practices of sourcing feeds from illegal trawls will continue to conflict with ecosystem needs for fish for human consumption. This will be further aggravated as the ISLME ecosystem continues to degrade and the demand for cheap sources of feeds increases. Similarly in Timor-Leste the seaweed industry will continue to be a gender biased fledgling industry which offers little or no market access and higher value added (e.g. post-harvest) opportunities for resource-poor households. In addition to the continued economic vulnerability, these coastal communities will also continue to be exposed to climate change impacts.

In this re-imagining of aquaculture as a solution, feed companies and feed ingredient suppliers need to inform a broader set of stakeholders of the risks and liabilities in their feeds. 'Fed' aquaculture will never be sustainable until there are better controls and oversight on feed supply chains. Thus, consideration for this project is not only timely, but essential as the challenges that we know are occurring in feed supply chains have never truly been revealed.

The non-fed aquaculture, and in particular seaweed, needs greater amplification as capital expenditures for seaweed aquaculture are low, which makes the livelihoods engaged in these supply chains more suitable for more impoverished countries with little ability to develop feed manufacturing, fertilizer plants or other infrastructure more sophisticated than for more intense forms of aquaculture. But seaweed aquaculture requires knowledge enhancement for a better return on investment. Understanding the differences in cost for poor vs good quality seaweed can make or break a livelihood, and with the growing eutrophication of coastal waters and the acidification of the oceans, it is imperative that seaweed aquaculture livelihoods are equipped with the best facilities and extension services to maximize product quality. Seaweed farmers are carrying out a service to the environment and making their livelihoods more valuable is critical. Lastly, because of GEF support for the Blue Horizon seaweed project, there is a hub to build off with great assets and market connections to share.

The benefits of this project will not be achieved without significant leverage and the GEF will not have sufficient leverage to achieve the ambitious goals of this project. The opportunity exists for the GEF to engage in something few donors have attempted, particularly around aquaculture feed. This aspect is innovative in and of itself, but the co-financing from the ADB represents an amplified leverage opportunity because of the magnitude of the loan to Indonesia for reforms and renovations to the shrimp aquaculture sector. Almost every aspect and every node of the shrimp value chain is being proposed for change in the ADB loan. The \$93 million loan from ADB to Indonesia creates a large opportunity for systemic change. The support from the GEF will not only signal the need for reform of the more impactful forms of aquaculture, but it will demonstrate the recognition of a growing problem in feed supply chains for animal proteins, writ large. The tracking and transparency aspects of this project are novel as they have only been attempted in one other instance, but the implications of transparency in the feed are large and the lessons learned will also be immense to be carried to other food sectors and other projects.



The seaweed component of this project in Timor-Leste will also have the additional benefit of a water harvesting and agroforestry loan from ADB. Although not the same as aquaculture, agroforestry will be coupled with water harvesting techniques that demonstrate how stored water can be used for secondary livelihoods. The approach is similar for seaweed aquaculture in which demonstration of better value from better handling of a product that provides an ecosystem service can be achieved.

Lastly, it is important to recognize the transaction costs of developing a GEF 7 project without considerable stakeholder buy-in. In the case of the proposed project, much of the buy-in has occurred through the loan processes, and alignment amongst government officials has already occurred which makes for a better situation for engagement with stakeholders should the project be approved, especially in a time of restricted movement because of the pandemic.

### **Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)**

The proposed project will generate quantifiable benefits across four of the GEF Core Indicators aligned with GEF International Waters. Specifically, the project will generate an improved area of marine habitat (Core Indicator 5). The proposed amplification of seaweed aquaculture in **Timor-Leste** is intended to produce an additional 375 tonnes of RDS across six sites by the end of the project, doubling production from 2021. Assuming an approximate rate of 10 mt of seaweed (dry weight) produced per hectare, this equates to an additional 37.5ha of seaweed beds (Currently estimated at 70ha). The additional seaweed beds will have been established as part of a wider EAA to sustainably manage marine resources and it is expected this will result in roughly 200 ha of improved marine habitat practices (**Core Indicator 5:** 200 ha marine habitat). The carbon content of seaweed varies by species but a conservative estimate is that for every 5 mt of dry seaweed produced, 1 mt of carbon is sequestered.[35][33],[36]34 Thus, the project would deliver the annual mitigation of 75 mt of CO<sub>2</sub>-e per annum, which over 10 year accounting duration would amount to 750 MT of CO<sub>2</sub>e (**Core Indicator 6:** 75 mt CO<sub>2</sub>-e mitigated per annum x 10 years = 750 MT CO<sub>2</sub>e). The standard industry reporting of livelihoods for seaweed aquaculture is approximately 1 direct job per 10 mt of the dry weight of seaweed but that is the growth of seaweed. The processing, drying, preparation, sales, seedling production, and equipment will likely result in a 5:1 ratio of secondary livelihoods to aquaculture production livelihoods. Of course, this project is intended to attract more producers to seaweed aquaculture production because of the increased value per unit of seaweed production. Thus, it is estimated the direct livelihoods of 300 households (men and women) will be enhanced from seaweed farming, or provide the equivalent of 37.5 jobs in full-time equivalent.

In **Indonesia**, under the ADB loan, one of the outputs will support value chain processes for shrimp aquaculture. This output will build farmers' capacity in brood stock, disease management, food safety, and environmentally sustainable production. The loan project will upgrade skills and knowledge of MMAF technical units on sustainable aquaculture and technology. Towards improved transparency, the loan project will facilitate the registration of brood stock and feed suppliers, farmers, aggregators and processors into the IndoGAP system and to register transactions in the MMAF STELINA (a transactional information database). Due to the fragmented nature of shrimp production in Indonesia, the government created their own scheme to harmonize national and international standards. The harmonized regulations capture the main elements of the shrimp value chain. These IndoGAP standards are based on FAO Technical Guidelines and ASEAN Shrimp Good Aquaculture Practices. The Government has established 3rd party certification bodies that will require approval by the Indonesian National Accreditation Committee / Komit Akreditasi Nasional (KAN). Hence the GEF project anticipates under **Core Sub-indicator 5.1**, One fishery meets national or international third-party certification that incorporates biodiversity considerations.

The intention of the **Indonesian** component of the GEF support is to cause the improved management of fisheries utilized in shrimp feeds. However, because of the opaqueness of feed supply chains, it is critical that a valid baseline of species used is created. A significant portion of wild caught fish for fishmeal in shrimp feeds is from incidental or indiscriminate catch and often the species are

---

unrecognizable. With an increase in transparency, it is posited that specific fish species used will become more apparent. Please refer to the discussion below:

#### Wild fish calculation methodology

According to the FAO, Indonesia produced 191,300 metric tons (t) of black tiger shrimp (*Peneaus monodon*) and 697,100 t of whiteleg shrimp (*Litopenaeus vannamei*) in 2019.[37]35 Estimating the amount of feed for tiger shrimp is difficult because feed is not necessarily used for the traditional production of shrimp. Because most whiteleg shrimp is fed and an FCR can be estimated to be 1.3 tons of feed per ton of whiteleg shrimp[38]36, the total amount of feed used is:

$$697,100T \text{ whiteleg shrimp} \times 1.3T \text{ feed} / 1T \text{ shrimp} = 906T \text{ of feed}$$

Data provided by Indonesia feed mill association suggested (GPMT) that the total amount of shrimp feed produced in Indonesia in 2019 was 352,248 t. MMAF suggested that the total amount of feed imported in 2019 was 46,229 t. From these estimates, the total amount of feed used for shrimp production in Indonesia in 2019 is 398,477 t. If all this feed was used to produce whiteleg shrimp, with the assumed 1.3 FCR, this would amount to 306,520 t of whiteleg shrimp produced in 2019. The discrepancy in the data from FAO and from GPMT/MMAF suggests a 2-fold error. If exported shrimp was used for this calculation, data from the Directorate General of Aquaculture in 2020 suggest a total volume of exported shrimp to be 161,449 t. This is an estimate of exported whiteleg shrimp and black tiger shrimp. Assuming the same FCR of 1.3, the total amount of feed for exported shrimp would be of shrimp to be 209,883 t feed. This figure is closer to the estimated feed volume provided by the GPMT/MMAF, if the difference between the total amount of feed used (GPMT/MMAF) ? 398,477 t ? and the amount of feed used for exported shrimp production 209,833 t represented feed for shrimp consumed in Indonesia (398,477 t feed total ? 209,833 t feed used for exported shrimp = 188,593 t feed for shrimp produced for domestic consumption). Of course, this still does not address the magnitude difference in production statistics reported by FAO. Dress out the percentage of specific shrimp products exported may be considered as a source of error. If one assumes an approximate dress-out or processed weight percentage of 50% of the unprocessed shrimp, the volume of exported product (primarily to the US, thus head-off), will double the overall shrimp production that was exported ? (306,520 t shrimp/0.5 = 613,040 t unprocessed shrimp produced). These figures are closer to those reported by FAO.

Greater effort will be needed to understand how these figures are gathered and what they represent. For the purposes of determining the amount of fish used for shrimp feed at this stage in the project, production numbers from the Shrimp Club Indonesia (SCI) will be used. In 2018, the volume of shrimp produced was 390,000 t. Approximately 90,000 t of black tiger shrimp (extensive and semi-intensive) was reportedly produced. Thus, approximately 300,000 t of whiteleg shrimp and 90,000 t of black tiger shrimp were produced in 2018. Recalculating the amount of feed for whiteleg shrimp using the assumption of an FCR of 1.3, the calculation is as follows:

$$300,000 T \text{ whiteleg shrimp} \times 1.3T \text{ of feed} / 1T \text{ of shrimp} = 390,000 T \text{ of feed}$$

The feed volume of 390,000 t is similar in magnitude to the total amount of feed reported by GPMT and MMAF used in 2019 for both species of shrimp (398,477 t). Of course, the remaining amount of feed (8,477 t) will be considered used for semi-intensive black tiger shrimp production. If an FCR of 1.5 is assumed for black tiger shrimp produced on feed for 2/3 of the production cycle, the calculation to determine the shrimp volume produced with this feed is as follows:

$$8,477 \text{ T black tiger shrimp feed} \times 1 \text{ T shrimp} / 1.5 \text{ T of feed} = 5,651 \text{ T of black tiger shrimp}$$

The black tiger shrimp production of 5,651 t will be considered on feed for 100% of the production cycle. However, semi-intensive production typically entails the use of feed following the first 1/3 to 1/2 of the production cycle. If the feed is assumed to be used during the second half of the production period, the calculated volume of black tiger shrimp produced through semi-intensive methods will double, i.e.  $5,651 \text{ t} / 0.5 = 11,303 \text{ t}$  of black tiger shrimp produced in semi-intensive culture systems. Thus, the production of black tiger shrimp production in extensive or traditional systems without the use of feed will be simply the estimated production of black tiger shrimp provided by the SCI minus the 11,303 t shrimp, i.e.  $90,000 \text{ t black tiger shrimp} - 11,303 \text{ t black tiger shrimp on feed} = 78,697 \text{ t black tiger shrimp produced extensively}$ .

Fish oil is expensive and used sparingly in aquaculture feed. Fishmeal, however, is commonly used as it tends to have the amino acid profile best suited for aquatic organisms. The amount of fishmeal used in feeds tends to be a mystery unless you have worked in a feed mill. Even then, production practices are not always uniform. For the purposes of these calculations, estimates of fishmeal inclusion in Indonesian shrimp feed are 5% and 7% for whiteleg shrimp and black tiger shrimp, respectively. Thus, the amount of fishmeal used in Indonesia can be estimated at:

$$[(390,000 \text{ t feed for whiteleg shrimp}) \times 0.05] + [(8,477 \text{ t of feed for tiger shrimp}) \times 0.7] = 195,593 \text{ t of fishmeal for shrimp feed in Indonesia}$$

Because the targeted fisheries for this project are in the ISLME, and anecdotal reports suggested that approximately 60% of Indonesia's fishmeal sourcing is local, approximately 40% of the total fish meal should be omitted as it is presumed to be imported.

$$195,593 \text{ T of fishmeal used for Indonesian shrimp} \times 0.6 = 117,356 \text{ T Indonesian sourced fishmeal}$$

The amount of fishmeal that can be rendered from 1 t of wild fish (wet weight) is 22.5%.<sup>[39]</sup><sup>37</sup> The corresponding volume of wild fish (presumed sourced from ISLME) that would be required to satisfy Indonesia's shrimp feed manufacturing demand can be calculated as follows:

$$117,356 \text{ T fishmeal} / 22.5/100 = 320,592 \text{ T wild fish from Indonesia}$$

It is unknown what species of fish are used in fishmeal in Indonesia. One study from 2013 noted *Sardinella longiceps*, *S. sirm*, *S. leigaster*, *S. clupeioides*, and by-catch as the primary fisheries used for Indonesian-produced fishmeal.[40]38 Without clear data provided by fishmeal renderers or feed companies, it is not possible to determine the impact this project intends to have on specific fisheries. However, because of the innovative nature of this project and the push for greater transparency, the desired outcome is to affect 25% of the Indonesian fisheries used for fishmeal in this project. Thus, 25% of 320,592 mt Indonesian wild fish used in fishmeal is 80,148 mt under improved management (**Core Indicator 8**: 80,148 mt wild fish move to more sustainable levels).

The direct beneficiaries for the Indonesian component of the project are expected to be in the form of farmers with better access to feed information and greater transparency up and down the shrimp and feed supply chains. Thus, the number of beneficiaries in the Indonesian component of the project is 1663 males and 1664 female persons throughout the supply chains. In Timor-Leste, the project will benefit 300 persons; 180 males and 120 females. The total project (Timor-Leste and Indonesia) would result in 1,843 males and 1,784 female beneficiaries (**Core Indicator 11**).

In Timor-Leste, the Ecosystems Approach to Aquaculture (EAA) will be carried out in six sites. It is expected 50 farmers in each site will complete the training and receive some inputs to establish seaweed beds, equivalent to 50 lines of seaweed each, which totals 6.25ha in each site. Seaweed production will be increased by 37.5ha in all sites. Considering the 'halo' effect of seaweed and better management due to EAA, it is expected 200ha of marine habitat will come under improved practices to benefit biodiversity.

Assuming a yield of 10 tonnes of seaweed (dry weight) per hectare/year, seaweed production on the 37.5ha will be 375 tonnes. The carbon content of seaweed varies by species but a conservative estimate is that for every 5 tonnes of dry seaweed produced, 1 tonne of carbon is sequestered[1]. This will result in 75 tonnes of green house gas emissions are mitigated.

---

[1] Duarte, C. M., Wu, J., Xiao, X., Bruhn, A., & Krause-Jensen, D. (2017). Can seaweed farming play a role in climate change mitigation and adaptation?. *Frontiers in Marine Science*, 4, <https://documents1.worldbank.org/curated/en/947831469090666344/pdf/107147-WP-REVISED-Seaweed-Aquaculture-Web.pdf>

#### **Other Co-Benefits from the Project**

-

BENEFIT	Indonesia	Timor Leste
---------	-----------	-------------

Climate Change Adaptation / Building resilience	<p>? Reduction of capture of trash fish could improve the volume of feed for Billfishes, Neritic tunas, Tuna and other high-value fish species leading to improved income for small scale fishers</p> <p>? Reduction of capture of trash fish could improve volume of small pelagic fishes for food security in Indonesia</p> <p>? Reduction of the capture of trash fish will reduce bycatch of Ocean based Endangered and Threatened Species (ETP) and the prey species that they rely upon</p>	<p>? Seaweed is a provider of ecosystems services and mitigates climate change by acting as a carbon sink through carbon sequestration.</p> <p>? Seaweed builds resilience by producing human feeds, animal feeds and fertilizer with a relatively low carbon footprint.</p> <p>? Seaweed reduces methane emissions from cattle farming that uses certain seaweeds as a feed supplement.</p> <p>? Seaweed improves soil conditions and potentially reduces agricultural pesticides through seaweed-based biofertilizer or bio-stimulants.</p> <p>? Seaweed provides habitats for fish and other marine organisms and reduces overfishing through providing alternative livelihoods for coastal communities</p>
Possible Job creation	<p>? New job opportunities in supporting technological solutions for feed mills and feed-to-shrimp supply chains</p> <p>? National Shrimp Plan (Outcome 1.1 and Marketing and Business plan (Outcome 1.2) will ensure strategic and sustainable growth of the whole Indonesian shrimp industry and more jobs for Indonesia</p>	<p>? The increase in seaweed production in Timor Leste due to the project will create the equivalent of 37.5 full-time jobs. However, seaweed production in Timor Leste is usually carried out by farmers on a part-time basis, along with other income generating activities.</p>

Socio-economic benefits	? New technologies and innovations that reduce the overall use of shrimp feeds and reduce losses from disease and poor husbandry, leading to increased profitability throughout the value chain	? Seaweed is a source of vitamins and minerals when eaten as a human food and can improve nutrition and household food security. ? Seaweed is suitable for the poor and landless as it doesn't require land ownership or large investment costs. Production cycles are also short providing regular income. ? Seaweed farming is suitable for women if the beds are close to home.
Resource mobilization	? New technologies and innovations in the whole shrimp supply chain	? Scientific and technological advances are broadening the uses of carrageenan as a food additive and other ingredients such as bio-fuels, bio-stimulants and fertilizer. ? There is recognition of seaweed as a provider of ecosystems services such as carbon and nitrogen fixation, producer of oxygen, nutrient storage and absorber of pollutants. This can lead to a market for carbon credits.
Green / Blue Multipliers	? Social enterprises to support the development of alternative protein sources to replace trash fish	? Possible benefits to the agriculture sector if seaweed is used as a livestock feed or fertilizer.
	? Knowledge management sharing across the Indonesian Shrimp sector and sharing of best practice in feed management and use	? Possible increase in value captured in Timor Leste if new seaweed-based products can be developed that are processed in Timor Leste.

	? Learning and education: Project interventions will contribute to building the scientific and technical body of knowledge on natural capital management and innovative financing.	
	? Financial and fiscal benefits for governments, such as reduced costs of environmental remediation of oceans ecosystems,	
	? The project will be reviewing a potential trash fish tax and licensing system which may contribute to new sources of tax revenue at both the national and provincial levels as an incentive for transitioning away from trash fish as a source of shrimp feed ? The project will be supporting alternative sources of protein for shrimp feed to replace trash fish	

### **Innovation, sustainability, and potential for scaling up**

This project is deeply dependent on the private sector to be the off-ramp for results / outputs. Thus, if the markets and market access are valued by the industry, this project will have a self-sustaining component. It is also clear that ?guides? for these sectors will exist in the STFs and the Safe Seaweed Coalition. Those institutional linkages will be maintained throughout and hopefully, beyond the life of this project.

### **Innovation**

This project?s innovation lies in the full supply chain approach that is required for competency in international markets. The coupling of the ADB loans to the government policy and private sector engagement makes this project unique, timely, and forward leaning with regards to the problems that are being attempted to be solved in the project. No GEF or government agency has attempted to track feed in development projects. It is incredibly challenging, but as aquaculture approaches 70% of its output using feed, development of the farming sector without the feed sector oversight could create more

environmental damage than the original condition. Further, simply the recognition that market oversight of the past is no longer suitable today is something that the shrimp sector is not known for and will be considered, if embraced, a new image of shrimp farming. While the shrimp farming sector in Indonesia could be on the verge of an overfishing/conversion free commitment, the seaweed sector in Timor-Leste has the opportunity to create a nature positive sector that is low input with high return. The focus on seaweed recognizes the limitations of feed and feed logistics in Timor-Leste and rather than building out a sector that will be dependent on imported feed, the growth of the seaweed sector does not require this. If the post-harvest, storage, and handling is improved, Timor-Leste could provide ample evidence of how a nation builds on the lessons from the past to make a more robust and diversified seaweed sector.

An important aspect of innovation is the ability to use resources produced in one region for other purposes in another region. Although not explicit because private sector engagement at scale has not occurred for this project, there is interest in the utilization of seaweed as an ingredient in shrimp feeds. There is a protein content inherent in seaweed, but the amino acid profiles are not aligned with the requirements of shrimp. However, the utilization of seaweed as a binding source could make the seaweed produced in Timor-Leste potentially available as a shrimp feed ingredient in Indonesia. Although this is possible, there is already a large seaweed sector in Indonesia, and it might be more feasible to consider the utilization of Indonesian seaweed rather than Timor-Leste seaweed in Indonesian shrimp feeds. Nevertheless, seaweed is being used in shrimp feeds already, but that is simply what is expressed by the authors of this document. There is no 'truth' to feed ingredients being used, except for the persons responsible for the formulation itself.

This information is challenging to obtain, but it is expected that this proposed project will create a demand for greater transparency. Although there has been no discussion to date within the STF on 'substitutes' for fish meal and oil, a product that does not require high manufacturing costs will be attractive to be used to reduce the cost burden of oversight in fisheries supply chains, and also will bring lower risks. Thus, through the proposed work, the utilization of non-traditional ingredients will be explored to not consider fish meal and oil as fundamental ingredients in feeds. Given recent developments in the alternative feed sources sector (with recent global start-ups like <https://www.ynsect.com>) as well as groups using bacteria and mould alternatives Output 2.1.4 has been modified to include support for R&D into alternative feed sources. The potential of cheaper and easily scalable alternative feeds to the current supplies of trash fish looks very hopeful. A local source of alternative feeds that builds on the use of locally available 'waste sources' such as palm oil kernel that is in plentiful supply across Indonesia could be a significant disruptor that would entirely remove the need for trash fish in the first place.

Another key innovation to be advanced, is related to the GEF IW Core Indicator on '*Globally over-exploited marine fisheries moved to more sustainable levels (metric tons)*'. Currently, there is no accepted methodology as this relates to sustainable and conversion-free feed, as well as other elements of the supply chain. The project will test some critical assumptions, consult with government and industry stakeholders, undertake data analysis and suggest a methodology to address this metric. Reference the above section on 'Wild Fish Calculation Methodology'.

## **Sustainability**

The thematic intent of this project is to demonstrate that mitigation of environmentally harmful sectors and amplification of environmentally beneficial sectors of the aquaculture industry can be taken on simultaneously and with synergistic effects. We need to use our knowledge of the failures of the past to chart new courses for problematic sectors that help to reduce impact. We also require that less impactful sectors are amplified where possible to enable greater ecosystem benefits. The sustainability aspects converge as mitigation reduces threats and amplification increases positive outcomes. The integration of the country /sector Theories of Change and the ISLME Theory of Change, along with engagement with the main implementing partners and stakeholders within the ISLME Project Steering Committee also offers a strong platform for continued implementation and support beyond the life span of the project.

*Institutional Sustainability:* In Timor-Leste, MAF fisheries staff will be trained in EAA and improved seaweed production techniques enabling them to continue facilitating sustainable marine resource



planning and providing technical support for seaweed production and post-harvest handling once project support stops.

*Financial Sustainability:* Financial sustainability will come in the form of market demands for the reforms being taken in Indonesia and the engagement of the STF to bring buyers and producers closer together to cooperate on challenges to supply chain oversight.

Ultimately, the financial sustainability of seaweed production is based upon the international price for RDS. However, improving market linkages by increasing the number and diversity of buyers will reduce dependence on a handful of buyers and increase financial sustainability

*Social sustainability:* Social sustainability is core to this project because collaboration and cooperation is necessary for the success of this project. The ADB and GEF safeguards provide reinforcing mechanisms to protect communities. Creating industries with greater transparency will also provide greater leverage and bargaining power with middlemen who can exploit small-holder farmers. Transparency through market engagement will help communities of growers to become more empowered. Additionally, as noted above, greater volume leverage will achieve greater value, but collaboration and cooperation will be required which will reinforce community cohesiveness.

The EAA approach proposed for implementing the seaweed activities is based on community consultation and participation to produce an equitable marine resource plan for all stakeholders. Tara bandu is a traditional Timorese conflict management tool that can also be used to gain social consensus for equitable resource planning

### **Scaling up**

As noted above, the sustainability of this project relies on the private sector to provide the off-ramp for the project-supplemented costs. Moreover, the purpose of this project is to mitigate some of the key environmental degradation caused by shrimp feeds to access more and better markets while supporting increased production for seaweed to amplify the positive aspects of that sector. Scaling will be present if private sector support has been achieved. The critical aspect for scaling will be how institutionalized the shrimp/feed tracking system is in Indonesia and how well the Timor-Leste seaweed growers engage with markets. Both the shrimp and shrimp feed sector in Indonesia and the seaweed sector in Timor-Leste will have the opportunity to showcase their work to the private sector, but a deep understanding of what is desired from the markets will be key to demonstrating readiness by Indonesia and Timor-Leste to engage in different and newer markets. Fundamentally, this project is to prepare and ready the country's sectors for these market opportunities. Two other contributing factors for scaling up include: i) couching this GEF project within the emerging ISLME Strategic Action Plan framework, and ii) the high potential for use of locally available shrimp feed ingredients in Indonesia..On the latter, it is possible that market forces will drive the introduction of local, more sustainable sources of feed ingredient due to the high cost of importation.

---

[1] FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.  
[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)

[2] Boyd, C.E. and A.A. McNevin, 2017. Land use in shrimp aquaculture. World Aquaculture 49 (1) pp. 28-34. <https://onlinelibrary.wiley.com/doi/epdf/10.1111/jwas.12841>

[3] Cai J, Lovatelli A, Aguilar-Manjarrez J, Cornish L, Dabbadie L, Desrochers A, Diffey S, Garrido Gamarro E, Geehan J, Hurtado A, Lucente D, Mair G, Miao W, Potin P, Przybyla C, Reantaso M, Roubach R, Tauati M, Yuan X. 2021. Seaweeds and microalgae: an overview for unlocking their potential in global aquaculture development. FAO Fisheries and Aquaculture Circular No. 1229. Rome, FAO. <https://doi.org/10.4060/cb5670en>

- [4] Boyd, C. E., & McNevin, A. A. (2012). An early assessment of the effectiveness of aquaculture certification and standards. *The Roles and Limitations of Certification*, 35. [https://www.researchgate.net/publication/288811510\\_An\\_early\\_assessment\\_of\\_the\\_effectiveness\\_of\\_aquaculture\\_certification\\_and\\_standards](https://www.researchgate.net/publication/288811510_An_early_assessment_of_the_effectiveness_of_aquaculture_certification_and_standards)
- [5] Boyd, C., & McNevin, A. (2015). *Aquaculture, resource use, and the environment*. John Wiley & Sons. [https://www.agrifs.ir/sites/default/files/Aquaculture%2C%20Resource%20Use%2C%20and%20the%20Environment%20%7BClaude%20Boyd%7D%20%5B9780470959190%5D\\_0.pdf](https://www.agrifs.ir/sites/default/files/Aquaculture%2C%20Resource%20Use%2C%20and%20the%20Environment%20%7BClaude%20Boyd%7D%20%5B9780470959190%5D_0.pdf)
- [6] Cai J, Lovatelli A, Aguilar-Manjarrez J, Cornish L, Dabbadie L, Desrochers A, Diffey S, Garrido Gamarro E, Geehan J, Hurtado A, Lucente D, Mair G, Miao W, Potin P, Przybyla C, Reantaso M, Roubach R, Tauati M, Yuan X. 2021. Seaweeds and microalgae: an overview for unlocking their potential in global aquaculture development. *FAO Fisheries and Aquaculture Circular No. 1229*. Rome, FAO. <https://doi.org/10.4060/cb5670en>
- [7] FAO. 2021. *Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019* (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021. [www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)
- [8] FAO. 2019. *Globefish Trade Statistics*. Rome. <https://www.fao.org/3/ca9528en/CA9528EN.pdf>
- [9] Globe Newswire, 2019. Shrimp: The Future of the \$45+ Billion Market, 2019-2024. Accessed October 5, 2022. <https://www.globenewswire.com/news-release/2019/06/13/1868220/0/en/Shrimp-The-Future-of-the-45-Billion-Market-2019-to-2024.html>
- [10] Mainly Asian tiger shrimp and whiteleg shrimp. Daniel Workman. Big Export Sales for Frozen Shrimp. World's Top Exports. <https://www.worldstopexports.com/big-export-sales-for-frozen-shrimps/>
- [11] Whiteleg shrimp production uses semi-intensive or intensive technologies with substantial feed from feed mills, water control with pumps and aerators, high stocking rates, and purchase post-larvae from hatcheries. <https://www.adb.org/sites/default/files/project-documents/55020/55020-001-sddr-en.pdf>
- [12] Government of Indonesia, Statistics Indonesia. 2021. Jakarta. [https://statistik.jakarta.go.id/media/2021/11/20211221\\_DKI\\_Jakarta\\_Provincial\\_Government\\_Sectoral\\_Statistics\\_2021.pdf](https://statistik.jakarta.go.id/media/2021/11/20211221_DKI_Jakarta_Provincial_Government_Sectoral_Statistics_2021.pdf)
- [13] HS121221 seaweeds fit for human consumption; fresh, chilled, frozen or dried; whether or not ground. HS121229 seaweeds and algae not fit for human consumption; fresh, chilled, frozen or dried; whether or not ground. <https://iopscience.iop.org/article/10.1088/1755-1315/860/1/012061/pdf>
- [14] HS130231 mucilages and thickeners, agar-agar, whether or not modified, derived from vegetable products. HS130239 mucilages and thickeners, whether or not modified, derived from vegetable products. <https://iopscience.iop.org/article/10.1088/1755-1315/860/1/012061/pdf>
- [15] USD1 = IDR14,822 (Oanda 11.9.22)
- [16] Naylor, R.L., Hardy, R.W., Buschmann, A.H. et al. A 20-year retrospective review of global aquaculture. *Nature* 591, 551-563 (2021). <https://doi.org/10.1038/s41586-021-03308-6>
- [17] Alexandra Langford, et al. 2021. Price analysis of the Indonesian carrageenan seaweed industry. <https://www.sciencedirect.com/science/article/abs/pii/S0044848621014915>
- [18] Mordor Intelligence. 2021. Carrageenan Market - Growth, Trends, COVID-19 Impact, and Forecasts (2022-2027). <https://www.mordorintelligence.com/industry-reports/global-carrageenan-market-industry>
- [19] <http://www.fao.org/indonesia/news/detail-events/fr/c/1184212/>
- [20] Neish (2019) Report on a Seaweed Value Chain Scoping Mission in Atauro Island, Timor-Leste
- [21] STELINA is a downstream, government-hosted traceability system that synthesizes data from existing systems that currently and disparately host fisheries information. STELINA also operates with high interoperability, allowing data exchange between the system of the MMAF and external systems of the private sector (e.g., processing companies), for example when first buyer enters a fishing license number, STELINA will retrieve vessel data from the MMAF fishing license system (SIPEPI) to match and verify and ensure seamless traceability to trace back feeds to the species and the country they came from and traced to the supplying fish processor or handler and by species or mix of species for each delivery ? thereby ensuring full traceability of feed.

- [22] <https://www.adb.org/sites/default/files/project-documents/55020/55020-001-sddr-en.pdf>
- [23] <https://www.seafoodtaskforce.global/>
- [24] <http://www.iuuwatch.eu/map-of-eu-carding-decisions/>
- [25] <https://www.marin-trust.com/>
- [26] <https://www.asc-aqua.org/>
- [27] <https://www.msc.org/>
- [28] FAO Guidelines the Ecosystems Approach to Aquaculture  
<https://www.fao.org/3/i1750e/i1750e00.htm#:~:text=%E2%80%9CAn%20ecosystem%20approach%20to%20aquaculture,interlinked%20social%20ecological%20systems.%E2%80%9D>
- [29] Technical guidelines for managing aquaculture areas using an ecosystems approach from KKP DGA Regulations Number 154/Per-DJPB/2019. Technical Instruction for Aquaculture Area management with an Ecosystem Approach
- [30] [https://www.asc-aqua.org/wp-content/uploads/2017/06/ASC-Responsible-Feed-Standard\\_v0.2.pdf](https://www.asc-aqua.org/wp-content/uploads/2017/06/ASC-Responsible-Feed-Standard_v0.2.pdf)
- [31] [https://www.bsn.go.id/uploads/attachment/draft\\_skema\\_sertifikasi\\_indogap\\_bagian\\_cpib\\_dan\\_cibi.pdf](https://www.bsn.go.id/uploads/attachment/draft_skema_sertifikasi_indogap_bagian_cpib_dan_cibi.pdf)
- [32] <https://www.republicsystems.com/products/>
- [33] [https://www.asc-aqua.org/wp-content/uploads/2021/06/Feed-Standard\\_QA\\_published-15.06.2021-1.pdf](https://www.asc-aqua.org/wp-content/uploads/2021/06/Feed-Standard_QA_published-15.06.2021-1.pdf)
- [34] [https://www.asc-aqua.org/wp-content/uploads/2021/06/Feed-Standard\\_QA\\_published-15.06.2021-1.pdf](https://www.asc-aqua.org/wp-content/uploads/2021/06/Feed-Standard_QA_published-15.06.2021-1.pdf)
- [35] Duarte, C. M., Wu, J., Xiao, X., Bruhn, A., & Krause-Jensen, D. (2017). Can seaweed farming play a role in climate change mitigation and adaptation?. *Frontiers in Marine Science*, 4, 100.  
<https://www.frontiersin.org/articles/10.3389/fmars.2017.00100/full>
- [36] World Bank Group. Seaweed Aquaculture for Food Security, Income Generation and Environmental Health.  
<https://documents1.worldbank.org/curated/en/947831469090666344/pdf/107147-WP-REVISED-Seaweed-Aquaculture-Web.pdf>
- [37] FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ).  
 In: FAO Fisheries Division [online]. Rome. Updated 2021.  
[www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en)
- [38] Boyd, C. E., McNevin, A. A., Davis, R. P., Godumala, R., & Mohan, A. B. C. (2018). Production methods and resource use at *Litopenaeus vannamei* and *Penaeus monodon* farms in India compared with previous findings from Thailand and Vietnam. *Journal of the World Aquaculture Society*, 49(3), 551-569. <https://onlinelibrary.wiley.com/doi/abs/10.1111/jwas.12524>
- [39] Boyd, C., & McNevin, A. (2015). Aquaculture, resource use, and the environment. John Wiley & Sons. [https://www.agrifs.ir/sites/default/files/Aquaculture%2C%20Resource%20Use%2C%20and%20the%20Environment%20%7BClaude%20Boyd%7D%20%5B9780470959190%5D\\_0.pdf](https://www.agrifs.ir/sites/default/files/Aquaculture%2C%20Resource%20Use%2C%20and%20the%20Environment%20%7BClaude%20Boyd%7D%20%5B9780470959190%5D_0.pdf)
- [40] Sudaryono, A., Hasan, M., & Yusuf, C. (2013). Analysis of traceability and sustainability of fish meal and fish oil on aquafeed industry in Indonesia. *Aquacultura Indonesiana*, 14(3), 135-148. <http://eprints.undip.ac.id/67589/1/AI-2013-143135.pdf>

#### 1b. Project Map and Coordinates

**Please provide geo-referenced information and map where the project interventions will take place.**

#### MAP of INDONESIAN SEAS LME

Candidate sites for Indonesia are identified below, and subject to review and confirmation during inception.



Figure 17: Locations of shrimp aquaculture supply chain activities (with coordinates)



Figure 18: Locations of seaweed aquaculture activities

Atauro Dili, Timor-Leste

8° 14' 24" S, 125° 34' 48" E  
Metinaro Dili, Timor-Leste  
8° 32' 0" S, 125° 44' 0" E

### 1c. Child Project?

**If this is a child project under a program, describe how the components contribute to the overall program impact.**

N/A

### 2. Stakeholders

**Select the stakeholders that have participated in consultations during the project identification phase:**

**Civil Society Organizations** Yes

**Indigenous Peoples and Local Communities** Yes

**Private Sector Entities** Yes

**If none of the above, please explain why:**

**Please provide the Stakeholder Engagement Plan or equivalent assessment.**

A series of stakeholder consultations were conducted between 01 December 2020 and 11 October 2021. A listing of these is provided in Table 4 (dates can be provided on request). A project consultation (in-person and online) was conducted in Jakarta in early September alongside visits to a feed mill on 31 August, 2022 (PT Gold Coin) with MMAF staff. The meeting with PT Gold Coin included a tour of the facility, a discussion on sourcing policies, traceability, and a better understanding of the fast growth of shrimp feed demands in Indonesia.

The company sources considerable amounts of fish meal and fish oil from both domestic and international sources. They have a mix of ingredients that go into their products and rely on a handful of intermediates to supply their product, but what is most important to them is consistency of product (and volume). When asked about what goes into their products they said that was their 'proprietary information'. During the factory tour, there were stockpiles of clearly labelled scads (*decapterus spp*), which could be considered as trash fish, tuna processing offcuts, as well as several liquid vats of fish oil with no clear labelling. The sourcing information and other details on the stockpiled ingredients were not immediately available. The factory was well managed and all batch numbers are well recorded and fully traceable from the factory out to their clients but not for feed sources coming into the facility.

Efforts were made to reach local community-based organizations, however due to the COVID-19 pandemic which was characterized by strict granular lockdowns in the project areas, and internet connectivity issues with remote areas, these were limited. During project preparation, efforts will be redoubled, and hopefully addressed by opportunities to travel.

In September 2022, several stakeholders were met during a field visit to Timor-Leste. Consultations were held with the National Director for Aquaculture and the Director of the National Institute of Fisheries and Aquaculture under MAF. Meetings were held with FAO, MDF, and WorldFish to share experiences and lessons learned implementing seaweed projects in Timor-Leste. Site visits were made to Atauro and Metinaro to meet seaweed farmers and a cooperative. Seaweed traders and exporters were also interviewed in Dili. Outside of Timor-Leste consultations were held with WWF, Konservasi Indonesia, and Yayasan Wisnu in Indonesia which have experience implementing seaweed projects in Bali. WWF

also has experience implementing the EAA in Lombok. Zoom calls were made with Blue Horizons and SSC, implementing partners for the seaweed project in Timor-Leste, to discuss possible activities.

### *Stakeholder Engagement Strategy*

The project will maintain engaged relationships with stakeholders throughout the project cycle across all outcomes. At the national and international levels, the project will use the ISLME structure for the engagement of government and non-government stakeholders across both TL and INO.

The project will provide multiple opportunities for feedback and engagement through the planned activities itemized under Outcome 1.1 the National Shrimp Plan 1.2 The Marketing Plan. KKP staff will be engaged fully in the project, not only at the national level and in the research facilities but through engagement with them at the provincial and district levels. Outcome 1.1 and 1.2 has planned multiple workshops that go beyond the typical one-way engagement and plans to engage a diverse set of stakeholders across the country to access the wealth of traditional knowledge and expertise of the stakeholders across the shrimp landscape in a meaningful way. Capturing this rich knowledge and ensuring it helps inform project decisions is essential, as is being transparent and sharing news and events within the shrimp sector and project outputs.

Below is a summary of how stakeholders will be consulted in project execution, the means, and timing of engagement, and how information will be disseminated, throughout the project/program cycle to ensure proper and meaningful stakeholder engagement of all members.

To achieve the requirements for stakeholder engagement and public consultations, as specified in the GEF Policy on Public Involvement in GEF Projects a stakeholder engagement strategy will be adopted to ensure effective engagement between various stakeholders throughout the lifecycle of the project.

The project's stakeholder engagement activities will ensure dissemination of the project to promote better awareness and understanding of its outcomes and approaches. The project will identify people or communities that are or could be affected by the project as well as other interested parties (see Table 3).

The project will also ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them, through a process of information disclosure and meaningful consultation. The project will maintain engagement with stakeholders on an on-going basis through meaningful engagement across multiple platforms and social media channels during project implementation under Output 5, Knowledge Management. The stakeholder consultations and Outcome 1 National Shrimp Plan will ensure stakeholders are informed about the environmental and social consequences of the project implementation and ensure the opportunity for feedback.

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement

### Identification of stakeholders for engagement and methods of communication

In order to ensure inclusive participation and consultation, the following stakeholders have been identified for consultation on on-going basis. The list includes the identified social groups and persons that are associated with the project in different ways at all stages: persons and social groups affected directly or indirectly by the outcomes of the Project implementation, persons and social groups that participate in the project directly or indirectly, persons and social groups who are able to influence and



decide the outcomes and the manner of the Project implementation or make decisions based on the outputs of the project.

<b>Stakeholders to be affected, directly or indirectly, by the outcomes of the Project implementation</b>	<b>Stakeholders being able to influence and decide on the Project implementation or use project outcome for decision-making</b>
Vulnerable social groups (the elderly, the disabled, women and children)	Provincial and District / Municipal Governments (INO/TL)
Local community based organizations and inhabitants in the coastal zones of TL and INO surrounding project sites and adjacent locations	Coordinating Ministry for Marine Affairs and Investment, Ministry of Environment and Forestry (INO)
Shrimp farmers and communities they live in	KKP (MMAF) / BAPPENAS (INO)
Seaweed farmers and the communities they live in	ISLME (INO/TL)
Non-governmental organizations (NGOs) operating at the local, regional, national and international level (including environmental organizations)	Ministry of Agriculture and Fisheries (MAF) (TL)
Media	Trash Fish fishers, traders and unlicensed and unregulated fishers
Business association, seaweed traders, Feed mills, Trash fish traders	Business association, seaweed traders, Feed mills, Trash fish traders
General public	Government policy makers at national, provincial and district (municipal levels) INO and TL

Table 3: Identification of stakeholders for engagement

In both Indonesia and Timor-Leste it is envisioned that civil society actors will participate as subcontractors and implementation partners. Their engagement will be guided by the procurement policies and processes of the executing partners. Some potential CSO/NGO partners on shrimp feed in Indonesia include Yayasan Konservasi Alam Nusantara (YKAN) (associated with TNC), Conservation International (CI), WWF and Aquaculture Stewardship Council (ASC) on third party certification. In Timor-Leste the provision of farmer training on improved seaweed production skills and facilitating blue carbon credits will be led by two local NGOs already identified, as well as the Coral Triangle Center, Blue Ventures and World Fish (part of CGIAR).

*SEE FILE ATTACHED: 23-04-23 Updated Stakeholder Engagement Plan*

*Indonesia*

#### Outcome 1.1 / Output 1.20

In preparing the National Action plans for shrimp aquaculture adopting the Area Management Approach, a series of multi-stakeholder consultations will take place with all interested parties. In addition to government partners, these will include shrimp farmers (men and women), shrimp traders, industry, and local government officials throughout the whole shrimp feed and shrimp export supply chain. Importantly coordination with the ADB loan will take place. A strong consultation process will necessarily be conducted by the contracting SHrimp Plan design team to ensure a strong Shrimp plan and marketing plan for international markets.

-

#### Outcome 2.1

In preparing a credible and functioning feed management system to connect shrimp feeds to shrimp products, a series of training and workshops will be conducted across five supply chains and two feed mills. In addition to these, lead partners engagement of the largely overlooked trash fish suppliers, fishers and fleets will also be conducted. In all of this work the engagement of local (provincial and district governments), as well as local community based organizations will be essential. A series of knowledge products will come out of this work and allow for sharing to a much broader audience and dissemination through the National Shrimp Plan and the work of the parallel outcomes.

#### Outcome 4.1

Engagement of the Indonesian shrimp industry leadership and associations with the STF and other partners will build on the engagement of the sector and partners as part of the National Shrimp planning process. As part of this work a community of practice will be created that engages all the stakeholders in different forums, as well as the conduct of project activities in the four main geographies where Shrimp farming is common (West Java, East Java, Sumatra, and Kalimantan) to ensure spread across the country. The Knowledge management specialist will support the dissemination of information in the appropriate medium and language across the whole project.

### ***Timor-Leste***

#### Outcome 1.1 / Output 1.2.1

When preparing the National Seaweed Aquaculture Strategy, a series of multi-stakeholder consultations will take place with all interested parties. In addition to MAF, government stakeholders are likely to include the Ministry of Finance; Ministry of Tourism, Commerce, and Industry; Ministry of Planning and Territory; Local Government authorities; Secretary of State for Environment; TradeInvest, and Timor-Leste Customs Authority. Private sector stakeholders will include representatives of seaweed farmer groups and seaweed traders/exporters.

#### Outcome 3.1 / Output 3.1.1

The GEF 7 Blue Horizons seaweed project in the Philippines and Viet Nam will develop methodologies for ecosystem service quantification that will be adopted in Timor-Leste. An ecosystems services consultant from Blue Horizons will be contracted to prepare a manual describing the methodology for quantifying ecosystem services to be used for training in Timor-Leste.

#### Outcome 3.1 / Output 3.1.2



Workshops will be held to develop the National Seaweed Aquaculture Strategy and methodologies to quantify ecosystem services. Relevant stakeholders to participate in the workshops will include the Ministry of Agriculture and Fisheries (MAF), Ministry of Finance; Ministry of Tourism, Commerce, and Industry; Ministry of Planning and Territory; Local Government authorities; Secretary of State for Environment; TradeInvest and Timor-Leste Customs Authority.

#### Outcome 3.1 / Output 3.1.3

The GEF 7 Blue Horizons seaweed project in the Philippines and Viet Nam will develop a framework for policy and regulatory gap analysis that will be adopted in Timor-Leste. A seaweed policy and regulatory gap consultant from Blue Horizons will be contracted to carry out the analysis in Timor-Leste.

Policy and regulatory gap analysis will be undertaken as an input for the National Seaweed Aquaculture Strategy and the same stakeholders will be consulted through workshops, as described above, and one-on-one meetings with the gap consultant.

#### Outcome 3.2 / Output 3.2.1

Carrying out EAAs will require the engagement of all stakeholders relevant to a specific area. This will include local MAF fisheries staff, the Ministry of Tourism, Commerce, and Industry; the Ministry of Planning and Territory; Local Government authorities; and local marine resource users such as fishers, seaweed farmers, and salt producers. Agencies responsible for carrying out the EAA, such as MAF and local government, will be trained on carrying out and implementing EAAs and all other stakeholders will be included in the assessment and planning of the EAA.

#### Outcome 3.2 / Output 3.2.2

Seaweed farmers will be engaged through training and demonstrations, preferably through groups described under Output 4.1.1

#### Outcome 4.1 / Output 4.1.1

Groups of seaweed farmers will be supported to improve market linkages through group activities, in addition to production training under Output 3.2.2. Support will be provided in the form of shared drying and storage facilities to aggregate RDS for the market.

#### Outcome 4.1 / Output 4.1.2

Farmer group leaders and traders/exporters in Timor-Leste will be trained in contract brokerage and export procedures to better engage with overseas markets.

#### Outcome 4.1 / Output 4.1.3

Established organisations which provide services to the seaweed sector will be contracted to provide specific areas of support to seaweed farmer groups and traders/exporters, particularly related to networking with new potential buyers. This could include market information, marketing plans, and new product development.

#### Output 4.1 / Output 4.1.4

Three workshops with the GEF 7 Blue Horizon project in Timor- Leste, Philippines, and Viet Nam to share lessons learned in each country.

***Regional / Global***

Table 4: List of potential key stakeholders and their possible contributions and roles in the proposed project

Stakeholder		Possible Roles	Means of Engagement
Indonesia			
Government Ministries / Agencies	Directorate General for Aquaculture (DGA), Ministry of Marine Affairs and Fisheries (MMAF)	Overall supervision of the project. Lead the Project Management Unit (PMU)	Regular PMU meetings (INO)
	The Directorate General of Strengthening Competitiveness of MMAF Marine and Fisheries Products (DGSCMFP)	Member of the PMU. Support implementation of all Outcomes for 2.1, policy support to Outcome 2.2 and administrative reviews and support of new policies based on the outputs of the project	Presentation of national Shrimp Plan by KKP and results adopted into the Medium-Term Development Plan (BAPPENAS), with a corresponding budget and Key Performance Indicators in KKP and other relevant Ministries Medium Term and Annual Work Plans (2025, 2026, 2027, 2028, 2029) (INO)
	Directorate for Marine Affairs and Fisheries, Ministry for National Planning and Development (BAPPENAS)	Support Outcome 1 with engagement in international markets and marketing activities related to shrimp exports	ISLME Coordination meetings (INO/TL)
	Indonesian Climate Change Trust Fund (ICCTF)	Adjustment of the RPJMN (Medium-term development plan) and the long- term development plan, called RPJP ( <i>Rencana Pembangunan Jangka Panjang</i> ) 2025-2045 in line with the results of the national plan report.  Member of the PMU.  Technical assistance if/as required and match / co-funding if applicable	

<b>Non-Government Organizations (NGOs)</b>	<p>Yayasan Konservasi Alam Nusantara (YKAN Indonesia), World Wildlife Fund (WWF), Conservation International</p>	<p>Involved with engagement as a stakeholder in Outcome 4 activities, particularly knowledge management and sharing related initiatives and collaboration with their on-going activities in aquaculture</p> <p>WWF became a member of PMU to provide environmental and social sustainability support to aid in ensuring project activities do not have unintended consequences and support in Outcome 5.</p>	<p>KKP regular CSO forums and engagement in PMU meetings and Outcome 1.1 and 1.2 (INO)</p>
<b>Multi-Stakeholder Coalitions</b> (including private companies and civil society organizations)	<p>Seafood Task Force (STF), Indonesian Feedmills Association (Gabungan Perusahaan Makanan), KADIN (Kamar Dagang dan Industri), Masyarakat Akuakultur Indonesia (MAI),</p> <p>the Shrimp Club Indonesia (SCI) and the Chamber of Commerce and Industry. Indonesian business chambers and associations umbrella.</p> <p>The MMAF Directorate General of Strengthening KP Product Competitiveness regularly organizes business forums on a national and international scale which will provide opportunities for further engagement.</p>	<p>STF engaged in Outcome 2.1 convenings of STF and 2.2 designing mass balance inspection protocol and 2.1.4 supply chain pilot validation exercises, 4.2.1 pre and post-project inspection by the seafood task force, 4.2.2 feed/shrimp tracking program implemented at project sites and 4.3 Supply chain renovations of shrimp traceability</p> <p>Involved with engagement as a stakeholder in Outcome 4 activities, particularly knowledge management and sharing related initiatives and collaboration.</p>	<p>KKP regular CSO forums and engagement in PMU meetings and Outcome 1.1 and 1.2 (INO)</p> <p>Attendance in global Shrimp and Feed Conferences, forums and hosting online events as budgeted for under Outcome 1.1 and 1.2 (INO)</p> <p>Conduct training with STF as budgeted in Outcome 4.1</p>

<b>Global Third Party Certification Organizations</b>	Aquaculture Stewardship Council (ASC), Marine Stewardship Council, INDOGAP (National), MarinTrust, Labor Rights Organizations	Engagement discussions and forums on Chain of Custody traceability, lessons learned from capture fisheries and aquaculture and their application into feed sourcing.	Explore the joint ASC-MSC Seaweed standard for viability (TL)  Engage with and build on ASC country pilots in project sites in East and West Java and sharing of Knowledge products and support for Outcome 4.1 Feed to Shrimp Value chain.
<b>Private companies</b>	Larive International (France), PT Gold Coin (Aboitiz Group) Cargill, Costco, Wal-Mart, and Mars Petcare, Danone, Nestle,	Engaged as part of the loan package and Outcome 2.2 designing and testing Mass balance inspection protocol	Showcase the two model Feed Mills traceability systems and food sourcing guidelines with STF members, identify overlaps and encourage conversations around market issues
<b>Universities and Research Institutions</b>	Jakarta Technical University of Fisheries  Bogor Agricultural University, Bigelow Laboratories, Auburn University,	Support in outcome 2.1.4 exploring supply chain the pilots to improve feed to the shrimp tracking system and alternative feeds through feed ingredient sources. Potential support methodologies for calculating ecosystem services, and feed analyses.	Engage the University labs working on alternative shrimp feeds as laid out in Outcome 4.1
<b>Timor-Leste</b>			

<b>Government Ministries / Agencies</b>	Directorate General for Aquaculture, Ministry of Agriculture and Fisheries (MAF)	Overall supervision of the project and chair of the steering committee	Memorandum of understanding with MAF for project supervision
	National Institute of Fisheries and Aquaculture (NIFA)	NIFA could be financed to establish and operate a seed nursery for cultivar trials in Liquica (Output 3.2.2)	Letter of Agreement with NIFA for a grant for seed nursery
	Ministry of Finance		
	Ministry of Tourism, Commerce and Industry	All agencies will participate in workshops to prepare the national seaweed strategy (Output 1.2.1) and regulatory gap analysis (Output 3.1.3)	
	Ministry of Planning and Territory		
	Local Government authorities		
	Secretary of State for Environment	MAF, MTCI, Min. Planning & Territory, Sec, State for Environment and Local Government will participate in preparing EAAs (Output 3.2.1)	
	TradeInvest		
	Customs Authority	Trade Invest and TL Customs Authority will provide training in export procedures (Output 4.1.2)	

	ADB	<p>GEF Agency Technical oversight and fiduciary management through the project cycle.</p> <p>Reporting to GEF.</p> <p>Observer status on PSC</p> <p>Participation of ADB Resident Missions to support / engage locally</p>	
--	-----	--	--

<b>Multilateral Development Institutions</b>	Food and Agriculture Organization (FAO)	FAO is a member of the steering committee for both countries and has experience implementing EAA in Timor-Leste. Opportunities for sub-contracting EAA activities to FAO (Output 3.2.1)	
	WorldFish Center	WorldFish has carried out a study for seaweed in Atauro and could provide training for seaweed farmers and MAF extension workers in production and post-harvest handling techniques (Output 3.2.2) as well as strengthening seaweed farmer groups (Output 4.1.1).	
		UNDP has a programme for the blue economy and has funded seaweed warehouses in Atauro and will support a micro-finance project for seaweed farmers on Atauro. Opportunity to link seaweed farmer groups to microfinance, to fund expansion of seaweed cultivation (Output 3.2.2)	
	United Nations Development Programme (UNDP)		

<b>Bilateral Development Institutions</b>	Market Development Facility (DFAT) Australia	MDF will provide production, drying, and marketing training to seaweed farmer groups on Atauro. There are opportunities to replicate and build upon their success in Metinaro (Outputs 3.2.2, 4.1.1, and 4.1.3)	
---	---	--	--



<b>Multi-Stakeholder Coalitions</b> (including private companies and civil society organizations)	Safe Seaweed Coalition (SSC),  Blue Horizons  Jaringan Sumber Daya Informasi dan Teknologi Rumput Laut (JaSuDa)	SSC membership for seaweed producer groups will facilitate networking with international traders (Output 4.1.3)  Collaboration with Blue Horizons will support quantification of ecosystem services (Output 3.1.1), policy and regulatory gap analysis (Output 3.1.3), improved production and post-harvest techniques (Output 3.2.2) and networking with international buyers (Output 4.1.3)  JaSuDa provides services to help farmers develop sustainable seaplant resources, supports MSMEs to produce value-added products and connects MSMEs to end users and builds strategic business alliances. JaSuDa continuously collects data on seaweed prices, conducts intensive and periodic research, and provides technical assistance and capacity building for MSMEs. Seaweed farmer group membership of JaSuDa facilitates improved networking with international buyers (Output 4.1.3)	Letter of Agreement for services provided
<b>Assorted technical specialists based in Asia and the Pacific region</b>		Expert to prepare national seaweed strategy (Output 1.2.1)	Service contract

<b>Private companies</b>	Cottonii	Seaweed farmer cooperative on Atauro that could be strengthened to improve market linkages (*Output 4.1.1)	
	Cottonii Fortuna Star, Best Sewaeed, Prosperous Elcel UNIP, Midway Best Lda	Seaweed aggregators and exporters in Timor-Leste that could be strengthened to improve market linkages (Output 4.1.2)	
	PT Algalindo Perdana, PT Galic Arthabahari, PT Giwang Citra Laut, PT Hydrocolloid Indonesia, PT Indonusa Algaemas Prima, CV Karaginan Indonesia	Large carrageenan processors in Indonesia that could buy from Timorese exporters (Output 4.1.3)	
<b>Community-level stakeholders</b>	Coastal communities and seaweed farmers, including women	Seaweed producers	
	Community-based organizations (CBOs)	Seaweed farmer groups for aggregation, drying and storage	
<b>Research Institutions</b>	Balai Perikanan Budidaya Laut Ambon	Source of improved seaweed cultivars (Output 3.2.2)	Letter of Agreement

**Select what role civil society will play in the project:**

**Consulted only;** Yes

**Member of Advisory Body; Contractor;** Yes

**Co-financier;**

**Member of project steering committee or equivalent decision-making body;** Yes

**Executor or co-executor;**

**Other (Please explain)**

During the project preparation period some CSOs were consulted, however additional consultation is needed in Indonesia. It is proposed that CSOs will be included in the participatory processes related to the action plan development in both Timor-Leste for seaweed and Indonesia for shrimp. CSOs will also be considered as contractors to deliver some specific outputs related to project implementation. From time to time, CSOs may also be invited to participate in the Project Coordination/Steering Committee to provide insights, guidance and advice as needed.

### **3. Gender Equality and Women's Empowerment**

#### **Provide the gender analysis or equivalent socio-economic assessment.**

'Accelerating Progress in Gender Equality' represents Strategic Operational Priority #2 within ADB's Strategy 2030. Under the gender operational plan, ADB focuses on five strategic priorities: (i) women's economic empowerment increased, (ii) gender equality in human development enhanced, (iii) gender equality in decision making and leadership enhanced, (iv) women's time poverty and drudgery reduced, and (v) women's resilience to external shocks strengthened. These are generally aligned with the priorities articulated in the GEF Policy on Gender Equality.

Many communities in South and Southeast Asia are strongly tied to marine and coastal resources that are essential for food security and livelihoods. Expansion of the global economy is leading to rapid transformation in coastal and marine resources, specifically through overfishing, illegal, underreported, and unregulated (IUU) fishing, and unsustainable coastal development. These rapid changes give rise to serious consequences for different groups of women and men in local communities that are at the front line in terms of dealing with the challenges of degradation and depletion of marine and coastal resources. The hardships they encounter often lead to changes in gender roles and rights.

Globally, almost 50% of the small-scale fisheries sector is made up of women - who are engaged in a range of activities - they fish, collect shellfish, mend nets, and are involved in post-harvest activities, such as processing, smoking, drying, salting, and marketing. Similarly, women also play a crucial role when it comes to seaweed farming and coastal aquaculture, however, their contributions to these sectors are often overlooked and underappreciated.

#### **Perspectives on Gender and Shrimp Farming in Indonesia**

Gender assessment for Indonesia yielded the following insights:

What are the key gender issues in the sector and/or subsector that are likely to be relevant to this project or program?

2020 National Statistics accounts 38,224,371 people work in agriculture, forestry, and fishing sector, out of which 13,795,740 (36%) are women. Accurate, regular sex-disaggregated statistics for aquaculture are not available. Aquaculture is still dominated by men. Women are predominant in aquaculture-related marketing and processing (832,035 women; 524,640 men). The 2019 report of the Food and Agriculture Organization of the United Nations (FAO) suggests that on average, there are 1.7 times more women than men in processing and 1.5 times more in marketing (2,882,316 women; 1,963,829 men). There is a growing recognition that women are active not only in post-harvest activities but also in cultivation and harvesting. Article 45 of the Law Number 7/2016 concerning the protection and empowerment of fishermen, fish cultivators and salt farmers affirms the state's obligation to increase the role and involvement of women in all business activities in the marine and fisheries sector down to the smallest scale, which is the family level.

The 2017 case study by FAO and WorldFish found low direct participation by, and opportunities for, women in shrimp farming. Women are engaged in two main roles: shrimp farm lead operators and casual laborers. Only a very small number of women engaged as lead operators in the site; in contrast to larger numbers of women in shrimp sorting and grading which is informal, insecure and of low value in terms of payment. Poor women mainly access the opportunities for casual labor. Their rare engagement as shrimp farm operators being found only amongst medium and high wealth group women.

Women play a significant background role in the financial management of shrimp farming (in which men were lead operators), with men tending to seek their wives' input to mitigate potential financial risk associated with the investment. It will be important for government actors to focus policy support on ensuring gender equal access to land and pond ownership through inheritance, and to financing and collateral. This includes gender-equal mechanisms for land and house ownership, including clear and accessible gender-equal title registration.

Does the proposed project or program have the potential to contribute to the promotion of gender equity and/or empowerment of women by providing women's access to and use of opportunities, services, resources, assets, and participation in decision making?

The project (loan + GEF) will support increased participation of women in (i) establishment of farmer groups, (ii) technical support to farmers groups to access business capital, (iii) training of farmers and extension services agents, (iv) farmers certification in sustainable aquaculture practice, and (v) capacity building activities related to downstream process. National and district governments can lay the foundation for empowerment in aquaculture by sponsoring gender equality and awareness(communication) programmes both for men and women regarding equal rights and opportunities in economic activities as well as regarding the benefits of sharing household roles between genders. The project will promote (i) building/upgrading of broodstock centers and laboratories with disaster resilience, gender responsive and inclusive design features such as lactation rooms, separate male and female toilets, separate male and female prayer room, (ii) piloting traceability and logistic platform (STELINA) improved with sex-disaggregated data of chain actors and checklist of information related to human welfare including gender. The project will also formulate policy to ensuring gender equal access to land and pond ownership through inheritance, and to financing and collateral. The gender action plan will be prepared to support effective gender mainstreaming in the project outputs and activities.

Could the proposed project have an adverse impact on women and/or girls or widen gender inequality?

In Indonesia, the main farmed shrimp species is the whiteleg shrimp (*Litopenaeus vannamei*) accounting for 80% of production, which is produced by large companies and around half of the smallholders[1]. The population of Indonesia is 272,682,000 with a composition of 137,871,000 men and 134,811,000 women[2] In 2016, aquaculture employed 3.9 million, mainly smallholder farmers[3]. Of these, 401,841 brackish water farmers were operating over an area of 967,600 ha in 2020. The 2019 statistics for the fisheries sector revealed that women are predominantly involved in processing and marketing and make up only 8% of the workforce in the production segment[4]. The COVID-19 pandemic has negatively affected the sector. Each stage of the value chain (production, processing, transport of inputs, distribution, and wholesale and retail marketing) has been disrupted by COVID-19, broadening disparities among regions[5].

Aquaculture is largely dominated by men. Women are predominant in aquaculture-related marketing and processing. On average, there are 1.7 times more women than men in processing and 1.5 times more in marketing[6]. Gender in the aquaculture sector has been included in Indonesia's aquaculture program since 2011 through the collaboration of the Ministry of Women and Children Empowerment Protection and MMAF. This collaboration resulted in a joint decision of the two ministries (KPPPA No MEN-KP/III/2011) to increase gender mainstreaming in the marine and fisheries sector programs (including aquaculture). Moreover, the fisheries sector provides employment in fishing, aquaculture, post-harvest, and other related activities. August 2021 National Statistics reports that 37,130,676 people work in agriculture, forestry, and fisheries sector, out of which 12,903,992 (34.8%) are women. Sex-

disaggregated statistics of individual actor (KUSUKA holder) for aquaculture are women 57,102 (13.9%) and men 352,737 (86.1%) or a total of 409,839 people.

Despite the critical role of women in fisheries and aquaculture, there are substantial gender inequalities, minimal recognition, barriers to access of financial resources and limited decision-making power. By virtue of the lack of recognition of women's roles in aquaculture and seaweed farming, women have limited access to formal credit, to technology, and marketing opportunities.

The role of 'trader' is usually held by men, who have more access and negotiating power on how ocean products get from the water to market, or from processing facilities, which are in many cases around women's homes. Those traders, also known as 'middlemen', tend to put downward pressure on prices of products purchased from women, while being able to sell these same purchased products at marked-up rates, as they have access to assets such as transport, or basic technology, including cold storage or financial capital.

What emerges is a picture of women with limited access to and control over assets and resources, constraining gender norms, time, and the 'dual burden' of labour and household management (unpaid) as well as barriers to sustaining entrepreneurship. The outcomes are that:

- ? Women conduct considerable unpaid work, and income returns to this work are lower than that of men involved in paid labour for similar tasks

- ? Women are engaged in less profitable aspects of the value chain when they are paid. They are often engaged in post-harvest activities, which is the stage where the most losses occur due to a lack of electricity or proper storage facilities. This lowers the overall net incomes for traders and retailers

- ? Women vendors tend to sell lower-value merchandise due to a lack of access to capital and entry barriers to higher-end markets

- ? Women have lower rates of entrepreneurship than men in the fisheries and aquaculture sector. Combined with fewer opportunities this translates to less income or returns from fisheries and aquaculture which tends to perpetuate the cycle of poverty.

Indonesia has a strong policy framework for gender equality and disability inclusion. At the highest level, this includes stating the equality of all persons in the Indonesian Constitution, ratifying the UN Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) in 1984, ratifying the UN Convention on the Rights of the Child in 1990, and ratifying the UN Convention on the Rights of Persons with Disabilities (UNCRPD) in 2011 with Law No. 19 of 2011 on Ratification of the UNCRPD. The government passed Law No. 8 of 2016 on Disability which presents a fundamental shift for disability inclusion principles in Indonesia from charity to human rights. A particular policy is the Presidential Instruction No. 9/2000 on gender mainstreaming in each ministry's planning, budgeting, implementing, monitoring, and evaluation processes from national to local levels. The implementation at the local level is spelled out in Ministerial Regulation from the Ministry of Home Affairs No.15/2008. This is also reinforced by the RPJMN gender mainstreaming policy which consists of policies, indicators, and targets from each ministry. In addition, Indonesia committed to achieve Sustainable Development Goals No. 5 (gender equality and empowerment of all women and girls), and No. 8 (decent work and economic growth) by ensuring that gender equality and decent work conditions are among the targets of aquaculture development.

There is a growing recognition that women are active not only in post-harvest activities but also in the cultivation and harvesting of shrimp. MMAF has well established gender mainstreaming policies to increase the role and involvement of women in all business activities in the marine and fisheries sector down to the family level. Female fish farmers, due to their childrearing household-focused roles and responsibilities, have fewer opportunities to access government extension services, training, and aquaculture technologies. This access constraints them in advancing their farming skills and productivity, thereby reducing their competitiveness and income-making opportunities. The role of women in the

capture of domestic 'trash fish' remains unclear, however as the work brings transparency to this supply chain there is a high likelihood of women traders and their involvement. A more equitable approach to fisheries and aquaculture holds the promise of delivering many potential benefits, including productivity and household incomes, positive nutritional outcomes, and improved ecosystem services.

A gender action plan is shown below (Table 6) and includes the following elements:

- a. Linkages with the CTI-CFF Women Leaders Forum (WLF) hosted by the Coral Triangle Center (CTC). Priorities of the GEF project will be aligned with those articulated in the next phase of the CTI-CFF Regional Plan of Action 2.0 (2020-2025)
- b. Gathering and analysis of sex-disaggregated data
- c. Activities designed to increase gender awareness and sensitivity among all stakeholders, including knowledge management and learning
- d. Inclusion of gender analysis and gender elements in project capacity development and training
- e. Activities to increase women's agency beyond economic power and decision-making to create space for leadership
- f. Address concerns related to gender-based violence in coastal communities, and
- g. Upskilling of women in higher value-added activities, financial and market acumen, and entrepreneurship.

During project preparation, there will be a number of factors to consider to take steps in closing gender gaps and promoting access to, and control over resources (natural, physical, financial, etc.) for women:

Changing the division of labour in the aquaculture supply chain:

Ensure that: i) women's knowledge of environmental management is captured in strategy development, action planning, implementation, and downstream business operations, ii) new techniques and good practices in aquaculture take gender considerations into account, iii) women engage in industry consultations and are trained in good aquaculture practices across the entire value chain to enable broader participation in the sector, as well as improve business acumen.

Increasing access and control over resources:

Ensure that: i) sex-disaggregated data includes considerations related to access and control over resources (e.g. land, water, capital, etc), ii) impacts of design of new techniques and approaches are discussed with and in to take account of women's views, iii) men and women have equal access to benefits of project interventions, iv) women have a legal or traditional right as owners / managers of natural resources.

Enhancing women's social status and role as decision makers in sustainable aquaculture:

Ensure that: i) women and men have equal access to information, including equal access to interaction with 'buyers' such as those represented in the Seafood Task Force and Safe Seaweed Coalition, ii) any proposed policy and legal reforms contribute to increasing women's status in the industry, iii) affirmative actions are supported to allow women to take leadership roles in stakeholder organizations, including government, business / industry, and civil society.

Executing Agency (EAs) capacity to encourage and supervise gender action plan implementation:

Ensure that: i) EAs have a policy and practice with respect to gender equality that are aligned with ADB and GEF principles, ii) EAs are judicious in gathering and curating sex-disaggregated data related to the project implementation, iii) EAs should encourage policy support to provide gender equal access to land and pond ownership through inheritance, and to financing and collateral. This includes gender-equal mechanisms for land and house ownership, including clear and accessible gender-equal title registration, and iv) gender specialists are engaged to support project implementation and contribute to the design of all knowledge management activities.

### **Perspectives on Gender and Seaweed Farming in Project Areas of Timor-Leste**

Rapid gender assessment was conducted during the PPG phase around project sites in Timor-Leste. The seaweed value chain includes inputs, production, collection stage, and intermediary trade that includes sales to traders, which follow up with actors engaged in processing, retailing, and consumers.

Seaweed farming is conducted by family members, including women, and men. The core processes in seaweed farming include providing inputs (seedlings and ropes), cleaning the ropes, tying seedlings to ropes, attaching these to the main ropes at sea, daily maintenance at sea, collecting fallen seaweed, harvesting, untying seaweed, sun drying, and selling it to traders. In providing input, men normally secure the inputs as this sometimes involves traveling to other areas. In some cases, buyers provide inputs by agreements that farmers sell all or a percentage of their harvest to the buyers. Men and women are involved in cleaning the ropes on land before the seedlings are attached. All members of the family normally help in tying the seaweed seedlings to the ropes, although the women sometimes dominate this activity. This activity is often considered 'family work'. Men take the ropes with seaweed to sea by dugout canoe and attach the tied seaweed to the main ropes. The men are helped by relatives or neighboring farmers. Men and women check and clean the ropes daily. During harvest time, women collect fallen seaweed and untie the seaweed from the ropes. Data from studies in other countries, notably Indonesia, shows that women and men contribute similar amounts of labour to most processes in seaweed production

Table 5: Gender differentiation in seaweed activities in Timor-Leste

Source: Fitriana, Ria. 'Gender in Aquaculture and Fisheries: Engendering Security in Fisheries and Aquaculture?'. *Asian Fisheries Science Special Issue* 30S (2017): 245-264.

Activities	Male	Female	Comments
Providing inputs (e.g. seedlings, ties, ropes)	?	-	Find seedlings; mostly conducted by men as it required traveling to other villages
Tying seedlings to rope	?	?	Men and women involved in cleaning the ropes before seedlings were tied

Attaching the ropes at sea	?	??	Family work, predominantly done by women. Sometimes children were involved.
Daily maintenance at sea	??	?	Seaweed left to grow but maintained by checking the ropes and cleaning them from other algae and mud
Collecting fallen seaweed	?	-	Women mostly collected fallen seaweed
Harvest	?	?	Men harvested the seaweed at sea, using dugout canoes and bringing it to shore
Untie seaweed	?	??	Women mostly untie seaweed
Sun drying processes	?	?	This was family work; once untied, seaweed was sundried for two days. Dried seaweed was put into plastic sacks
Selling to traders	?	?	

? = this gender does this activity

?? = higher number of people in this gender do this activity



Seaweed farming is a good livelihood opportunity for small-scale coastal villagers. A study in Indonesia by Larson et al (2021) found evidence of positive economic and social impacts for women from seaweed farming. Seaweed is also emerging as a good cash mariculture in Timor-Leste. Seaweed is a productive activity as a family business and the farmers benefit economically. The farmers, either men or women, earn cash and use it for their daily family expenses.

Seaweed farming provides extra household income for renovating homes, and purchasing and maintaining motorbikes, in addition to other daily expenses. Women normally use earnings for daily expenses, whereas men tend to use the extra money for larger investments. Children may also receive additional 'pocket money'. This extra cash income from seaweed farming is important to improving quality of life. On the other hand, seaweed farmers also need to save for economic and climate-related downturns, for example to recover from storms, repair the ropes and buy new seedlings. The main ropes can be used for up to 3 years, while plastic ropes only could be used for up to one year. In addition, seaweed farming may be subject to variations in income due to disease and price fluctuations.

Many men and women farmers are likely to spend their gains from seaweed farming without considering events or bad seasons that could cause their farming businesses to suffer. Farmers who are not able to save to re-invest would tend to depend on external support. Although women and men farmers are likely to receive good benefits from seaweed farming, they are still vulnerable to variations in climate and other events which may impact harvests. Local traders are some of the key sources of support, however, they tend to put pressure on their client farmers over prices and product quality. Farmers risk being trapped into long term relationships with the traders. Increasing farmers' awareness of the importance of re-investment and savings, and the capacity to manage household budgets to improve financial resilience is essential.

In some areas, women are considered to be the day-to-day managers of the household and in control of household finances. Typically, larger expenditures and investments are jointly decided between men and women. To increase awareness of re-investment, interventions should target both women and men so that both have equal roles in farm development. Sometimes the farm owner and typically the head of the household is a man. Women, men, and children supply the farm labour. Seaweed farming is considered a family business, and both women and men work with a clear, but overlapping, division of labour.

However, some of the proposed interventions to increase seaweed production, could affect the division of labour between men and women. Fresh seaweed, prior to drying, is heavy and bulky and increasing production on a household basis will require more heavy lifting when harvesting the seaweed and transporting it to shore. Specifically, on Atauro, much of the near shoreline suitable for seaweed cultivation is already laid down to seaweed beds. Increasing production will require using floating raft technology in deeper waters, which necessitates the use of canoes. Therefore, if women are to continue seaweed farming in deeper water they will need to learn to operate canoes and both men and women will need to use buoyancy devices and be capable swimmers.

In some cases women and men work in different locations and ownership is classified differently. If production is to increase in Mentinaro, it is likely farmers who live inland away from the shoreline will need to establish seaweed beds. Under these circumstances, farmers typically build temporary shelters on the beach so they can maintain and guard their seaweed beds. Women are less likely to want to spend time away from home due to concerns for personal safety but also it would disrupt the traditional household duties of childcare and housekeeping. Farm ownership needs to be understood or the wrong target beneficiaries could be selected for transferring skills and technology. Often, the heads of households are invited to meetings, and women are left behind. Typically, men participate in community meetings. Women may feel 'inferior' in attending local community meetings, and consider male participation to be sufficient. Achieving gender equality at the community level, e.g., in meetings, relates to changing society's views on the role of women in the public domain. Women actively work in every aspect of seaweed farming, except where travel to distant places requires men to undertake. Women and men have different knowledge, skills, interests, and perspectives in seaweed farming and both genders have to learn how to adapt to the sea and improve farming methods. Farmers need to adjust to changing sea temperatures. The actors in post-harvest handling need to be recognised, as well as their methods and

the market requirements. For both men and women, seaweed farming is considered a full-time occupation. Especially the tying and untying processes require time and energy, with long hours of work, and exposure to wind, seawater, and other natural elements (including crocodiles).

The Timor-Leste seaweed aquaculture strategy will need to identify production targets and be clear on the roles and responsibilities of the key actors in the value chain. One way to do this is to recognize the participation of both men and women in every aspect of seaweed production so that interventions to increase production will be effective. Women and men have important roles in seaweed farming, post-harvest handling, and marketing. Addressing issues of improving production and quality and reducing post-harvest losses needs a comprehensive upgrading of the skills of all farmers. Ignoring men's or women's roles in seaweed farming undermines the challenge of reaching the producers. Women's and men's farming knowledge covers different elements of the farming practices as both play significant roles in different tasks in farming and post-harvesting. Women play significant farming roles from pre-farming, farming, and postharvest. Apart from targeting the key actors, it is also important to raise awareness of both men and women in generating savings to promote resilience and careful re-investment of resources in seaweed farming.

### **General principles related to GAP implementation:**

#### Changing the division of labour in the aquaculture supply chain:

Ensure that: i) women's knowledge of environmental management is captured in strategy development, action planning, implementation, and downstream business operations, ii) new techniques and good practices in aquaculture take gender considerations into account, iii) women engage in industry consultations and are trained in good aquaculture practices across the entire value chain to enable broader participation in the sector, as well as improve business acumen.

#### Increasing access and control over resources:

Ensure that: i) sex-disaggregated data includes considerations related to access and control over resources (e.g. land, water, capital, etc), ii) impacts of design of new techniques and approaches are discussed with and in to take account of women's views, iii) men and women have equal access to benefits of project interventions, iv) women have a legal or traditional right as owners / managers of natural resources.

#### Enhancing women's social status and role as decision makers in sustainable aquaculture:

Ensure that: i) women and men have equal access to information, including equal access to interaction with buyers such as those represented in the Seafood Task Force and Safe Seaweed Coalition, ii) any proposed policy and legal reforms contribute to increasing women's status in the industry, iii) affirmative actions are supported to allow women to take leadership roles in stakeholder organizations, including government, business / industry, and civil society.

#### Executing Agency (EAs) capacity to encourage and supervise gender action plan implementation:

Ensure that: i) EAs have a policy and practice with respect to gender equality that are aligned with ADB and GEF principles, ii) EAs are judicious in gathering and curating sex-disaggregated data related to the project implementation, iii) EAs will encourage policy support to provide gender equal access to land and pond ownership through inheritance, and to financing and collateral. This includes gender-equal mechanisms for land and house ownership, including clear and accessible gender-equal title registration, and iv) gender specialists are engaged to support project implementation and contribute to the design of all knowledge management activities.

**Table 6: Project Gender Action Plan**

Outcome	Output	Gender Action
<p>Outcome 1.1: Development and implementation of national strategies for priority commodities (Indonesia and Timor-Leste)</p>	<p>Output 1.1.1: Indonesia - National Action Plan for Shrimp Aquaculture adopting Ecosystems Approach to Aquaculture (EAA[1])[2] including climate change mitigations and resiliency prepared through multi-stakeholder consultations - to increase the environmental sustainability of the shrimp aquaculture sector executed.</p> <p>1.1.2 Marketing and business plan for renovated shrimp sector for greater magnitude of market reach developed (Indonesia)</p> <p>1.2.1 National Seaweed Aquaculture Strategy prepared through multi-stakeholder consultations - aligned with National Aquaculture Development Strategy to increase the environmental sustainability and ecosystem services of the seaweed sector (Timor-Leste)</p>	<p>Ensure that gender analyses and assessments for shrimp and seaweed aquaculture value chains are included in the Action Plan</p> <p>Encourage formulation of gender targets in national action plan for shrimp aquaculture</p>

<p>Outcome 2.1: A credible and functioning feed management system created, to connect shrimp feeds to shrimp product to satisfy growing international market demand (Indonesia)</p>	<p>2.1.1 Two convenings of Indonesian government, feed and processing sectors to be trained on requirements to access markets of the Seafood Task Force (STF) (Indonesia)</p> <p>2.1.2. Mass balance inspection protocol to validate feed to shrimp tracking generated (Indonesia)</p> <p>2.1.3: Shrimp feed action plan developed (with links to 1.1.1 and 1.1.2 above). System requirements for feed-to-shrimp tracking co-created by government and industry, and supported by roadmap and execution timeline ? with links to National Strategy for Shrimp Aquaculture (Indonesia)</p> <p>2.1.4: Five supply chain validation exercises to refine and improve feed-to-shrimp tracking system supported (Indonesia)</p>	<p>Ensure that at least 30% of trainees covering STF requirements are women</p> <p>Ensure that Shrimp Feed Action Plan, part of the National Shrimp Aquaculture Action Plan, includes gender dimensions (and targets if possible)</p> <p>Supply chain validation exercises should consider gender roles in feed to shrimp tracking and include targets where possible</p>
---	---	---

<p>Outcome 3.1: Seaweed aquaculture and capture of nutrients from the ocean expanded (Timor-Leste)</p>	<p>3.1.1. Blue carbon credit payment agreements facilitated for seaweed ecosystem services</p> <p>3.1.2: Workshops conducted to develop/implement 1.2.1 and 3.1.1, including representation across key ministries and involvement of relevant private sector</p> <p>3.1.3: Policy and regulatory gap framework analysis from GEF 7 Blue Horizon project adopted and applied to Timor-Leste to generate policy recommendations including zoning, mooring, prevention of marine mammal entanglements, and carrying capacity</p> <p>3.2.1: Sustainable marine resource management and planning demonstrated in Atauro and Metinaro. (Timor-Leste)</p>	<p>Workshops under 3.1.2 will include at least 40% women</p> <p>Management planning and demonstration activities in Atauro and Metinaro should include at least 50% women in the consultations, and encourage / support women-based enterprises in the seaweed sector</p>
<p>Outcome 3.2: Seaweed farmers increase production and adopt sustainable seaweed production techniques (Timor-Leste)</p>	<p>3.2.2 Improved production and post-harvest handling techniques demonstrated in Atauro and Metinaro districts</p>	<p>Encourage at least 50% women's participation in demonstration of production and post-harvest handling in seaweed aquaculture sites</p>

<p>Outcome 4.1: Timor-Leste seaweed farmer groups engage with more diverse markets</p>	<p>4.1.1: Seaweed farmer groups strengthened to aggregate and store raw dried seaweeds (RDS) (Timor-Leste)</p> <p>4.1.2: Traders and seaweed farmer group leaders trained in contract brokerage and export procedures (Timor-Leste)</p> <p>4.1.3: Seaweed traders and farmer group leaders network with international buyers (Timor-Leste)</p> <p>4.1.4: Expanded collaboration through 3 workshops with GEF 7 Blue Horizon seaweed aquaculture project participants result in 2 product off-take agreements (Timor-Leste)</p>	<p>Inclusive approaches are followed to ensure participation of at least 40% women in the strengthening of the capacity of seaweed farmer groups</p> <p>At least 3 women-led seaweed farmer groups aggregating seaweed for the market".</p> <p>Feed/shrimp tracking program action plan communicated equally to men and women as target audiences</p>
<p>Outcome 4.2: Engagement of Indonesian shrimp industry leadership/associations with the Seafood Task Force</p>	<p>4.2.1: Pre- and post-project inspection by the Seafood Task Force (STF) to understand STF requirements and confirm requirements have been met (Indonesia)</p> <p>4.2.2: Feed/shrimp tracking program action plan communicated/socialized and implemented at project sites (Indonesia)</p> <p>4.2.3: Supply chain renovations of shrimp traceability, broodstock and hatchery facilities, controlled intensification of farms and product quality and safety controls demonstrated in 5 buyer visits to renovated sites will inform business and marketing plans for greater market access (see 1.1.2). (Indonesia)</p>	

<p>Outcome 5.1: Full participation in IW:LEARN and knowledge management/communication</p>	<p>5.1.1: Participation in two IW:LEARN regional meetings, one GEF Biennial International Waters Conference (IWC) delivering IW:LEARN experience notes, and in the East Asian Seas (SEAS) Congress by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) (Indonesia and Timor-Leste)</p> <p>5.1.2 Sharing of good practice across GEF-supported large marine ecosystem (LME) / regional SEAS programmes in Asia and the Pacific, including ISLME, Gulf of Thailand (GOT), Bay of Bengal (BOBLME), Sulu Celebes Sea (SCS), Arafura and Timor Seas Ecosystem Action Programme (ATSEA), Yellow Sea LME, and others ? with focus on strategic action programme (SAP) implementation</p> <p>5.1.3 Knowledge products, such as,</p> <p>a. Lessons on improved production techniques Ecosystems Approach to Aquaculture, Marine Spatial Planning, (MSP), private sector engagement, feasibility of carbon markets, supply-demand models for different seaweed products for Timor-Leste</p> <p>b. Lessons on aquaculture policy and strategic directions for Indonesia with the inclusion of improved tracking of feed (And feed sources) through shrimp aquaculture supply chains</p> <p>c. Marine ingredient sourcings guidelines and framework for traceability incorporating STELINA (or equivalent) into traceability</p> <p>d. What is trash fish, how it is caught, what alternatives are there, and why it is an essential part of Indonesia's marine ecosystem that is undervalued</p>	<p>Equal participation of men and women in regional meetings and international conferences</p> <p>Women and women's organizations are targeted for sharing good practices. Youth groups, where possible, would be included.</p> <p>Knowledge products are developed through a gender lens and disseminated to target audiences which include women, women-based organizations, and youth where possible.</p>
---	--	--

	e. Alternative feed sources to trash fish (domestic and international) in the development of shrimp feeds	
--	---	--

---

[1] Whiteleg shrimp production uses semi-intensive or intensive technologies with substantial feed from feed mills, water control with pumps and aerators, high stocking rates, and purchase post-larvae from hatcheries.

[2] Statistical Yearbook of Indonesia 2022, Page 49.



[3] Government of Indonesia, Ministry of Marine Affairs and Fisheries. 2019. 2018 Annual Report. Jakarta. Of all fish producers in Indonesia, 80% are smallholders and 20% are large-scale companies. Yayasan Inisiatif Dagang Hijau. 2018. Investment Guideline for Sustainable Aquaculture in Indonesia. Jakarta. <https://www.idhsustainabletrade.com/uploaded/2018/12/Aquaculture-Summary-4.6-WEB.pdf>

[4] On average, there are 1.7 times more women than men in processing and 1.5 times more in marketing.

[5] Food and Agriculture Organization of the United Nations. 2020. The Impact of COVID-19 on Fisheries and Aquaculture Food Responses (Information Paper).

Rome. <https://www.alnap.org/system/files/content/resource/files/main/CB2537EN.pdf>

[6] Gender Barriers in Aquaculture and Fisheries, Indonesia Australia Partnership Program [https://pair.australiaindonesiacentre.org/wp-content/uploads/2020/06/PAIR-overview\\_Gender.pdf](https://pair.australiaindonesiacentre.org/wp-content/uploads/2020/06/PAIR-overview_Gender.pdf).

**Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?**

Yes

**Closing gender gaps in access to and control over natural resources; Yes**

**Improving women's participation and decision making Yes**

**Generating socio-economic benefits or services or women Yes**

**Does the project's results framework or logical framework include gender-sensitive indicators?**

Yes

#### **4. Private sector engagement**

**Elaborate on the private sector's engagement in the project, if any.**

#### **Indonesia**

In Indonesia, the project will interact directly with small scale shrimp aquaculture practitioners, intermediaries involved in market transactions, potential wholesale buyers, and processors at all levels in the value chain. The success of the Indonesian component is directly related to the success of the interventions identified in the ADB loan being achieved. These involve better hatchery production, better shrimp farm siting and production, processing capacity increased, and traceability and transparency in the supply chain. The increased professionalization that is proposed in the ADB loan sets a trajectory for the oversight and accountability in the feed supply chains proposed in this project. As the changes are realized in the shrimp supply chain of Indonesia, it will attract the attention of the STF a progressive-leaning approach, and would be symbolic for the expansion of the group to Indonesia. The main factors that would be considered attractive to the STF are:

- a. A willingness of the private sector to make large-scale changes in a precompetitive fashion;
- b. The ability to trace farmed shrimp from processing back to farms;
- c. The willingness of the feed companies to provide greater transparency in ingredient supply chains;
- d. The government's desire to carry on the enforcement of policy changes that increase the sustainability and transparency of the value chain;
- e. The willingness of the private sector to commit to conversion-free shrimp that entails no further intact habitat degradation for shrimp farms;
- f. A heightened emphasis on the social well-being of workers in supply chains for feed ingredients and shrimp.

The STF is a membership-based trade organization that is composed of commercial members that are owners of farmed shrimp supply chains (farm to a processing plant), feed supply chains (feed ingredients to feed manufacturers), and tuna supply chains (from catch to processing). Members include Costco Wholesale Corporation, Sodexo, Sysco, Wal-Mart, Target, CP Foods, Thai Union, Thai Royal Frozen, Marine Gold, Kingfisher, Bumblebee, Chicken of the Sea, Nestle, Mars, and others.[1] The approach is to provide full supply chain oversight rather than the model of certifying each node of the supply chains. Further, this approach is based on statistical sampling that allows the scaling of the oversight model. Supply chain owners map their respective supply chains and submit them to the secretariat where a full scope oversight is put in place for factories and a limited scope oversight (sampling) is put in place for farms and fishing vessels. Part of the commitment of the STF members is for C-Free shrimp production and traceability. Additionally, their 10-Point Plan for 2021 identifies Indonesia and India as countries for expansion.[2]

The model of oversight that the STF uses will be mimicked to better align with their oversight model. Additionally, there will be a convergence of efforts by a number of NGOs that are attempting to make conversion-free shrimp and conversion-free commodities in feed a new norm. This entails retail, food service, pet food, and feed company commitments that are being developed through a variety of partners that likely will be in place by the end of the full project proposal phase. It is important to recognize that if private sector interventions are made, they will be done in collaboration with the government as these changes can be initiated by international buyers, but the ability to maintain them will require policies and regulations that maintain the culture of compliance in value chains. Specifically, efforts will be made to promote direct interaction with the private sector feed mill companies. Through project interaction with the STF, private sector engagement will be enhanced. The STF is not expected to co-finance the proposed work, but the ?buy-in? from the STF will be if they are comfortable expanding into Indonesia via the collaboration proposed in this project.

KADIN, the Chamber of Commerce and Industry will be a critical partner for engagement with Outcome 1.1. through the Directorate General of Strengthening Competitiveness of MMAF Marine and Fisheries Products (DGSCMFP) which has the mandate for national and international marketing engagement. KADIN is well versed in the development of national strategies for priority commodities and their engagement in the design, data collection, and ultimately development and dissemination of the proposed plan.

Private Sector	Means of Engagement
Costco Wholesale Corporation, Sodexo, Sysco, Wal-Mart, Target, CP Foods, Thai Union, Thai Royal Frozen, Marine Gold, Kingfisher, Bumblebee, Chicken of the Sea, Nestle, Mars, and many others are members of the Seafood Task Force	<p>The companies are all members of the Seafood Task Force that will support and conduct training as part of the project under Outcome 4.1.</p> <p>Outcome 1.1.1(National Action Plan fr Shrimp) and 1.1.2 (Marketing and Business Plan) will engage the whole national (and international) Shrimp Supply chain and provide ample opportunities to engage across the supply chain</p>

KADIN, the Chamber of Commerce and Industry will be a critical partner for engagement with Outcome 1.1. as will the Indonesian feed mills association (Gabungan Perusahaan Pakan dan Ternak ? GPMT)	Engagement will be through the MMAF Directorate General of Aquaculture in partnership with the Directorate General of Strengthening Competitiveness of MMAF Marine and Fisheries Products (DGSCMFP)  Outcome 1.1 and 1.2 will engage the whole national (and international) Shrimp Supply chain and provide ample opportunities to engage across the supply chain
The Aquaculture Stewardship Council, the Marine Stewardship Council, MarinTrust, and Fair Trade organizations who all have Indonesian teams and offices	Engagement will be through the Directorate General of Strengthening Competitiveness of MMAF Marine and Fisheries Products (DGSCMFP)

### Timor-Leste

The entire project is based on enabling Overfishing/Conversion Free Supply Chains for shrimp and seaweed coming from the ISLME. Success of the project will be associated with the private sector maintaining the protocols put in place as the transition occurs off of ADB loan funds and GEF grant funds. The ADB has also brought the private sector to bear in its market engagement in horticulture and shrimp value chain loans.

The project will interact with the private sector in Timor-Leste at the level of the small-scale seaweed aquaculture practitioners, the intermediaries involved in market transactions, and potential wholesale buyers and processors (primarily international). Currently, there are four major aggregators for seaweed harvests in Timor-Leste, which is probably adequate for the volume of seaweed produced. Whilst increasing production, the key will be for Timor-Leste aggregators to engage with more international private sector RDS buyers and also buyers who supply alternative markets to carrageenan to diversify end markets and reduce the risk when carrageenan prices fall. The table below summarises the companies relevant to the seaweed sector and how they will be engaged in the project:

Private Sector Companies	Means of Engagement
Cottonii, Fortuna Star, Best Seaweed, Prosperous Elcel UNIP, Midway Best Lda	The companies buy RDS from seaweed farmers and export to traders in other countries, who then sell to carrageenan processors. Training will be provided to the companies on contract brokerage and export procedures to better engage with international markets. The companies will also be provided with networking opportunities to diversify their customer base and sell directly to carrageenan processors.

PT Algalindo Perdana, PT Galic Arthabahari, PT Giwang Citra Laut, PT Hydrocolloid Indonesia, PT Indonusa Algaemas Prima, and CV Karaginan Indonesia	The companies are the larger carrageenan processors located in Indonesia. Networking events will be held with the companies to facilitate direct contracts with seaweed exporters in Timor-Leste
---	--

Networking with international private sector buyers will be facilitated through seaweed information-sharing hubs such as Safe Seaweed Coalition and JaSuDa. An economic analysis of the value gains that can be achieved will be vetted with the Blue Horizon private sector partners and this analysis will serve as the engagement step towards international market access. Additionally, many of the Blue Horizon private sector stakeholders are part of the Safe Seaweed Coalition. Through the Safe Seaweed Coalition, private-sector engagement will be enhanced.

[1] <https://www.seafoodtaskforce.global/about/current-members/>

[2] <https://www.seafoodtaskforce.global/wp-content/uploads/2021/02/SFT-10-Point-Plan-2021.pdf>

## 5. Risks to Achieving Project Objectives

**Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.(table format acceptable):**

#	Identified risk	Level	Potential consequence	Counter measure
1	Inability to develop shrimp to processing traceability (Indonesia)	High	If this is not achieved in Indonesia, the shrimp/feed tracking will not be possible	Greater outside market forces demanding the traceability of shrimp to farm origin to leverage processing plants  The introduction of a private sector traceability system building on those already developed such as TruTrace and commitment from buyers to adopt that system
2	A lack of will by feed companies to engage in the feed/shrimp tracker (Indonesia)	High	Maintenance of BAU and the continuance of unknown impacts of feed ingredients in shrimp feed supply chains	Engagement with international feed companies to provide discounted pricing with greater assurances for the international markets.

3	A lack of will by middlemen and farmers to participate (Indonesia)	High	If there are missing links in the supply chain that are required to record and transfer information, no traceability can be established	<p>Policy and regulation must address these issues of compliance. The government will be/feel empowered to require changes in support of greater prosperity in the export markets.</p> <p>The private sector ? somewhere in the supply chain ? will be required to exert the leverage to see this work successful.</p>
4	Unable to trace source and supplies of trash fish	High	Shrimp feed tracking will not be possible	Work with KKP team and Seafood Task Force to find sources of trash fish and produce a comprehensive policy to track all sources including the adoption of a system like STELINA or other
5	Inability to track imported feedstuffs	High	If imported feed ingredients cannot be tracked effectively through import controls, there could be a substantial amount of fishmeal coming into Indonesia without accurate records which <del>would</del> <u>will</u> hamper mass balance attempts at feed used and feed ingredients.	Early effort must be exerted to gain support from appropriate ministries that manage and oversee imported goods to Indonesia. A firm grasp of what is know and what is not will need to be developed and the support of Bappenas, KKP is necessary to assist in bringing other ministries into this process.
6	No policy / legal definition of ?trash Fish?	Med	There is a need to define what ?trash fish? in law/policy, to allow for it to be tracked at local/national levels	Work with KKP / MMAF to legally define ?trash fish? which will allow its tracking in fish landings through to supply in feed mills (and other uses)
7	There is a doubling of effort to use certification to address the lack of transparency in shrimp feed supply chains (Indonesia)	Med	BAU continues and instead of an outcome-based solution, a process-based solution (with little evidence of success) is implemented	<p>There is a growing awareness that not every farm and every fisher can be certified. This awareness itself might be reason enough not to default to certification</p> <p>Another clear measure to counter this is the reality of certified facilities now and the inability to trace their product in supply chains</p>

8	The activities of the loans not synced with the activities of the GEF grant (Indonesia and Timor-Leste)	Low	Delays <del>would</del> <u>will</u> exist in getting systems and personnel in place such that the next step in system development can occur	It is expected that the planning process for the GEF grant will provide sufficient time for activities to begin with the loans and create momentum
---	---	-----	---	--

9	Timor-Leste parliamentary elections to take place in 2023	Med	Disruption to MAFs operational capacity and implementation of the project due to policy changes, budget revisions, staff changes etc	Preparation of other stakeholders (farmers, groups, aggregators) to continue project implementation during temporary interruptions.  Preparation of other non-government service providers (trainers, networkers) to continue during temporary interruptions
10	Significant fall in international RDS prices (Timor-Leste)	High	Farmers stop producing seaweed	Seek alternative markets in addition to carrageenan, such as bio-stimulants, which may not have such volatile price changes
11	Increased outbreaks of ice-ice (Timor-Leste)	Med	Reduced production and seaweed farmers stop production	Training in improved management
12	Crocodile attacks on seaweed farmers (Timor-Leste)	Low	Seaweed farmers abandon seaweed beds	Surveillance of crocodile numbers and locations as part of EAA
13	Increase in pollution (Timor-Leste)	Med	Reduced production and seaweed farmers stop production	Use of EAA in area resource planning
14	Conflict between marine resource users (Timor-Leste)	Med	Reduced production	Use of EAA and Tara Bandu to prevent potential conflict

15	Reinstatement of COVID-19 containment measures (or new pandemic)	Med	Delays in project implementation	<p>Adaptive management measures will be developed to manage a possible reinstatement of COVID-19 containment measures based on prior experience.</p> <p>Standard prevention and response measures will be included in project administration guidance. The project will comply with international (WHO), national and local policies, protocols and practices to the extent possible. Some measures would include: i) provision of appropriate protective equipment (masks, gloves, sanitation devices), ii) limitation of face to face interaction (e.g. including social distancing) and shift to hybrid or on-line forms of work, iii) limitations on local and international travel, iv) regular antigen testing regimen, and v) strong and regular monitoring and reporting practices.</p> <p>Please refer to associated section on ?Build Back Blue?</p>
----	--	-----	----------------------------------	--

### **Environment and Social Safeguards Screening**

A comprehensive assessment for TL and INO has been conducted in coordination with the ADB loans in consideration in both countries. These reports are attached as Appendices to this report. Based on the review of both TL and INO the ESS Rating is **?moderate risk?** and details of this assessment are summarized below.

#### **Indonesia**

##### ***Climate Risk Screening***

Indonesia consists of over 17,000 islands and has the third longest coastline in the world. Millions of Indonesians live in low-lying coastal locations just above sea level. Sea-level rise, globally, has been estimated by satellite observations to be approximately 3 mm per year since 1993.[1] Indonesia appears to have a higher-than-average sea-level rise according to satellite analysis which provides estimates of approximately 3.9 mm of sea-level rise per year.[2] Additionally, Indonesia ranks second only to China as the most earthquake-prone country in the world and it experienced a devastating tsunami in 2004 that claimed the lives of over 170,000 Indonesians. In 2018, a tsunami in Sulawesi resulted in nearly 4,000 deaths.

As Indonesia is situated in the Ring of Fire (the most seismically active region of the world), the earthquakes and potential for tsunamis will continue. The current increase in sea-level rise, human activity, and ground water depletion has also caused the subsidence of land in and around major cities in Indonesia, which are

commonly located near the coastline. For example, the land under Indonesia's current capital is sinking at an average rate of 1-15 cm per year, with the rates of sinking unevenly distributed around the city's districts, from 1 cm per year in the south to up to 15 cm in the west and 25 cm in North Jakarta.[3] The seismic activity, increased rate of sea-level rise, and the land subsidence in cities near coastlines create a heightened level of vulnerability to climate change.

Shrimp farms are typically sited on the coastline or in estuarine ecosystems. Appropriate siting dictates an understanding of the hydrodynamics and water quality parameters such as salinity, dissolved oxygen, temperature, pH, organic matter, suspended solids, and any toxic substances that may persist in the environment. Additionally, the soil that shrimp farms are built on is a critical aspect to consider as many low-lying areas, where wetlands once existed can accumulate pyritic sulfur formations that when exposed to air and water create highly acidic conditions. These areas are to be avoided for the success of the farming endeavor. Multiple years of modeling and understanding of seasonal fluctuations in physical oceanography are key to the sustainability of shrimp farm operations. Unfortunately, many shrimp farmers have no choice as to where they may site facilities.

Most shrimp farmers have inherited their farming area from generations before them. In addition, the recognition of what makes an optimal shrimp farming site has come late in the development of the sector, thus larger farms are also in areas that may not be optimal for shrimp production. The key challenge is to maintain the water quality in and around the shrimp farm. This is because shrimp have a weak immune system and easily become infected by pathogenic organisms. In Ecuador in the late 1990s, almost all shrimp production was lost to the white spot syndrome virus (WSSV). Between 2013-2015, Thailand lost almost 50% of their shrimp production as a result of early mortality syndrome (EMS). These diseases' pathogenicity and virulence are increased when shrimp are stressed. Thus, climate change and the various factors that would affect key water quality aspects will introduce two important challenges to the project: (1) shrimp will likely be maintained in stressed conditions because most farmers are reliant on ambient conditions of weather to maintain shrimp productivity and when the weather changes, there are very few contingencies that farmers can put in place to address these changes. (2) What is understood today about the optimal conditions for bacteria and viruses that cause disease will not be enough to predict what viral and bacterial organisms will be enhanced with hotter temperatures, higher or lower salinities, different algal and zooplankton species, etc.

Shrimp farmers are often characterized by living on the edge of extreme wealth and extreme poverty because of how easily production systems can be decimated by disease. Create a changing environment where the pace of change increases and it is not clear when and where the next disease for shrimp will come from, and biosecurity becomes the best and greatest asset. Measures for biosecurity in the face of climate change will be critical to incorporate into all shrimp aquaculture projects. It will become essential to be much better at spotting disease trends and making the broader sector aware such that adequate epidemiological safeguards can be constructed rapidly.

The overall climate risk rating for the project is classed as Medium. The 'medium risk' rating is mainly because of knock on effects on the project from risks associated with:

(i) Temperature increase: Increase in annual and seasonal temperatures is projected throughout most of Indonesia.

Indonesia's mean annual temperature has already increased by ~ 0.8°C over the period 2010-2017 relative to a 1951-1980 baseline. Analysis of CMIP6 climate models indicates that most of Indonesia is projected to experience temperature increases of ~1.5°C by mid-century relative to 1995-2014 (SSP5/RCP8.5). Increased temperatures are likely to cause poor growth and survival of some shrimp/fish species, water quality deterioration, thermal stratification, and increased virulence of warmer water pathogens.

(ii) Precipitation increase: Projected changes in precipitation are not uniform over Indonesia, and some areas may experience decreased precipitation. However, multiple model-based studies indicate that annual precipitation is projected to increase throughout most of Indonesia. Most projected increases occur during the wet season, while dry season precipitation may decrease (e.g., CORDEX-SEA). Increased seasonal precipitation (and runoff) will increase erosion and siltation of watercourses, flooding, and precipitation induced landslide events.



(iii) Flooding: Flooding is more closely associated with increases in short-duration (i.e., daily or sub-daily), high-intensity precipitation than with overall seasonal precipitation accumulation. Annual maximum 1-day precipitation (Rx1day) is projected to increase throughout the Indonesia region, with an increase ranging between 0% and 20%, particularly in Kalimantan, Sulawesi and northern Sumatera. Most (but not all) of these changes lie outside the range of historical variability. Increased frequency and/or magnitude of short-duration, high intensity precipitation is associated with enhanced risks from pluvial flooding, and from wet landslides, which are a common hazard in Indonesia. An increase in high-intensity precipitation will also result in higher rates of soil erosion and sedimentation of river channels and reservoirs, unless addressed by effective soil conservation measures. The impacts of flooding on aquaculture in Indonesia include changes to salinity in estuaries and coastal locations; loss of stock when ponds overflow or dykes collapse; increased sediment/pollution; and damage to (or destruction of) production facilities.

(iv) Precipitation decrease: Projected changes in precipitation are not uniform over Indonesia, and while most locations within Indonesia are projected to experience increased precipitation some areas may experience decreased precipitation. Also, even locations projected to experience an overall increasing precipitation trend will still experience drought periods due to the high degree of interannual to decadal variability associated with Indonesia's hydroclimate. While adaptation strategies need to be developed to manage increases in precipitation and floods, it is also important to ensure strategies are in place to manage and mitigate the impacts of droughts when they inevitably occur. Drought reduces freshwater supply to aquaculture locations and also negatively impacts rice/corn yields (i.e., feed supply and increasing production costs).

(v) Sea level rise: Indonesia is highly exposed to risks associated with sea level rise due to its island geography and large coastal cities with over 80,000 kilometers of coastline and 42 million people living less than 10 meters above sea level.<sup>1</sup> It is estimated that by the 2030s approximately 5.5 million to 8 million people could reside in a 100-year floodplain (an area exposed to 1-in-100-year coastal floods resulting from storm surges), growing to 9.5 million to 14 million people by the 2060s. These estimates assume a modest sea-level rise of 10 centimeters (cm) by 2030 and 21 cm by 2060. Sea level rise is not just a threat due to long-term encroachment on coastal areas, but also due to the projected increase in the frequency of extreme sea-level events. The return period of exceptionally high sea levels is expected to reduce, and low-lying Indonesian islands are particularly at risk. Wave heights which historically occurred only once every ten years could occur every 4 to 10 years by 2070?2100, even under lower emissions scenarios (SSP2/RCP4.5). Aquaculture, with most of the production centers located in low land, is highly vulnerable to sea level rise.

The main purpose of the project is not climate adaptation, the main purpose is to increase environmental sustainability of shrimp aquaculture feed supply in Indonesia. The project is fully aligned with Indonesia's updated Nationally Determined Contributions (NDC) as well as with the three key objectives associated with the Food and Agriculture Organization's (FAO's) definition of climate smart fisheries and aquaculture: (i) achieving sustainability of the business supply chains, (ii) ensuring shrimp resources, shrimp farmers and entrepreneurs, and shrimp aquaculture supply chains are resilient to the current and projected impacts of climate change, and (iii) where possible, reduce GHG emissions associated with business supply chains. The proposed project interventions are holistic and integrative, in line with the principles of climate-smart agriculture/aquaculture, and address key challenges of the stakeholders (e.g. farmers, communities, MMAF), the ecosystems (e.g. mangroves, water), built infrastructure (e.g. irrigation, canals, drains, ponds, electricity, roads, broodstock centers, lab facilities), and in the shrimp aquaculture supply chains from production, processing, logistics and distribution and access to markets.

### *Indigenous Peoples Screening*

The initial screening generated from geospatial analysis of the proposed sites shows no overlaps with Outcome 2 with Indigenous peoples, however, Outcome 1.1 will have an indirect impact on Indigenous peoples across the country. Further IP screening will be conducted at the four feed supply chains to confirm the potential impact on IP safeguard issues. The IPPF and IPP will comply with both government regulations and ADB social safeguard policy statements (2009).

### *Environment and Social Safeguards*

For the Shrimp Industry support, there is only minimal engagement at the field level for outcomes 1.1, 2.1 and 4.1 therefore according to the ADB SPS 2009, the project may fall under **Category C** as it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required.

Table 7: Summary of Potential Environmental and Social concerns, Level of Risk and Potential Mitigations (INO)

Summary of Potential Environmental and Social concerns	Level of Risk	Potential Mitigations
Growth in GHG emissions associated with increasing business supply chains of shrimp	Medium	The National Shrimp Plan will include a section on reducing GHG emissions throughout the entire global supply chain
Loss of livelihoods of trash fish fishers and fishing boats (potentially an IUU fishery)	Medium	There is little current information on the status of the trash fish fishery in Indonesia as more information comes to light the project team can adjust and adapt a mitigation section into the trash fish policy review
Potentially harmful alternative sources of protein to replace trash fish	Low	When considering alternative sources of protein into the shrimp feed (Outcome 2.1.4 supply chain pilot), environmental and social safeguards should form a core criteria alongside price

### Timor-Leste

#### *Climate Risk Screening*

Most seaweed production takes place on the island of Atauro which lies 30km to the north of the city of Dili. The region is quite small; only about 20km on its long axis and about 7.5km on its short axis, with a total area of 150km<sup>2</sup>. Within this area, the terrain includes most coastal areas and lower slopes with a small patch of upland area at about 800m elevation in the center. Rivers are generally short and steep and during periods following heavy rain can cause flooding in coastal streams.

- i) **Rainfall variance:** The annual average rainfall for Atauro is 960mm and the time series data for rainfall plotted in Figure 19 shows that there is a very slight increasing trend of about 22mm per decade. More importantly, the plots show that rainfall varies considerably from year to year, ranging from about 620mm to 1,390mm.

Figure 42 Annual rainfall timeseries, Atauro climate zone (1981-2021).

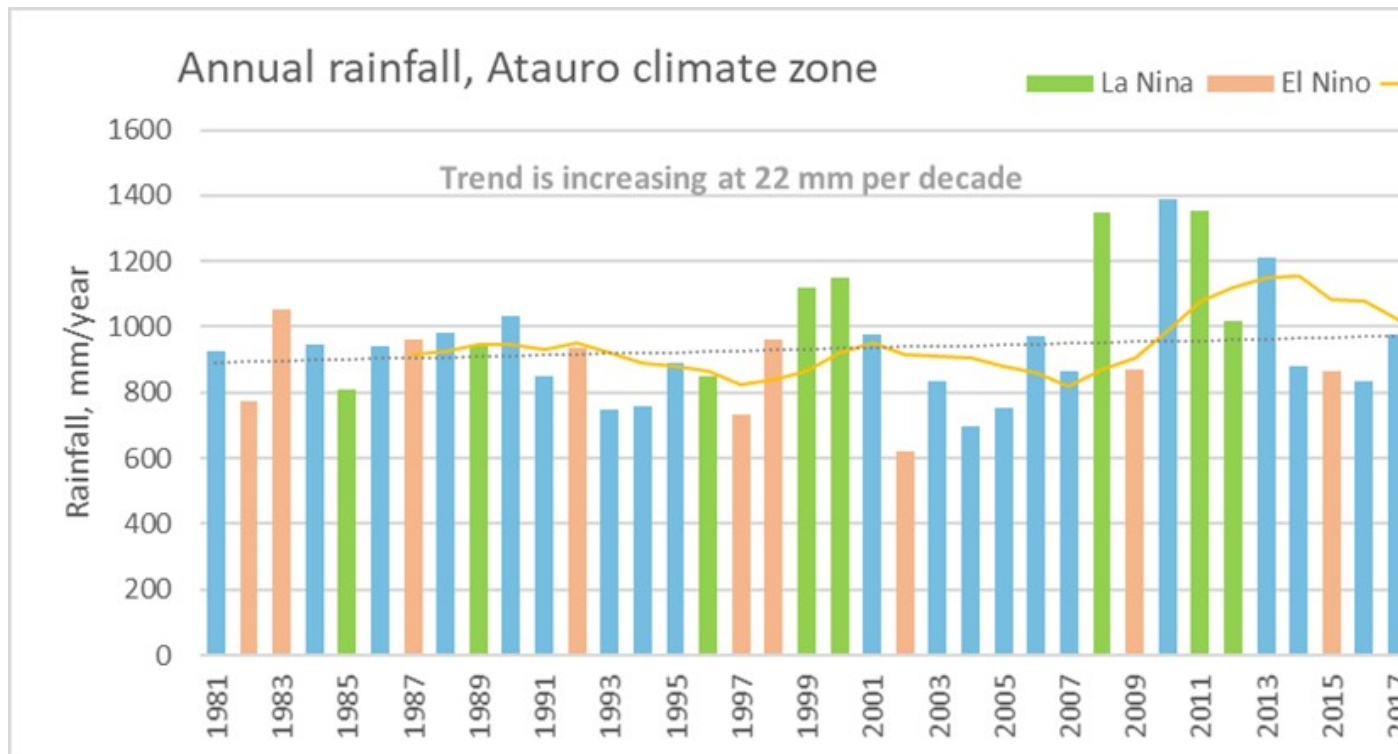


Figure 19: Annual average rainfall of Atauro from 1981 to 2021

There is significant inter-annual variability in rainfall, with the El Niño Southern Oscillation (ENSO) exerting a strong influence over rainfall variability. El Niño conditions bring drier conditions and shorter, delayed wet seasons, often causing droughts, whilst La Niña conditions cause higher rainfall even in the dry season and are linked to higher tropical cyclone activity. For the period 1950-1999 Dili recorded its two record low rainfall totals during the El Niño events of 1982-83 and 1997-98.

ii) **Temperature increases:** Timor-Leste has a hot and humid tropical climate influenced by the Western Pacific monsoon and the mountainous relief of the island. Average annual temperatures vary little throughout the year, but altitude exerts a strong influence, with annual temperatures averaging 27°C on the coast.[\[4\]](#),[\[5\]](#)

Estimates of the rate of temperature change vary from 0.16°C/decade since 1950[\[6\]](#) to a more modest 0.11°C/decade from 1979-2005[\[7\]](#). **Figure 20** displays the trend in temperature since 1980 around Dili, in the North, based on reanalysis data to provide continuity. The increase since around 2000, in particular, has been pronounced. Minimum, Maximum and Average temperatures will all increase under all scenarios. **16** For RCP4.5 average annual temperatures are likely to increase around 1°C for the 2036-2065 period, and 1.1-1.6°C for the 2066-2095 period, while for RCP8.5 increases are larger, with 1.2°C-1.6°C expected for 2036-2065, and 2.2-3.0°C for 2066-2095, all relative to 1986-2005.

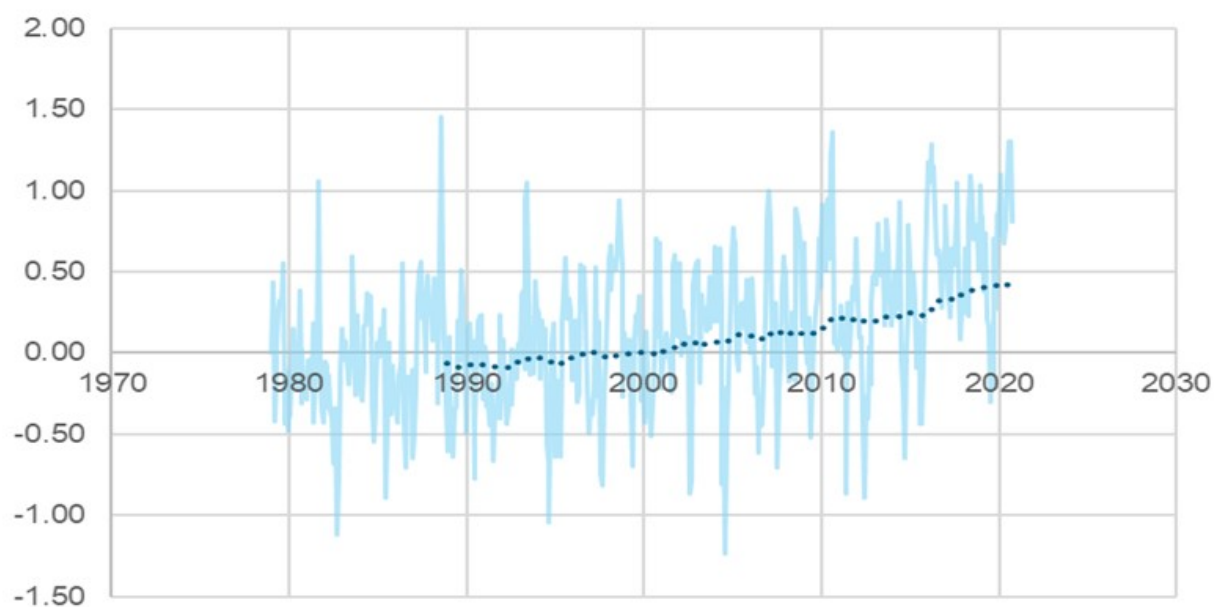


Figure 20: Monthly anomalies with respect to long term average temperature based on ERA5 reanalysis data (decadal moving average trend) Source: KNMI Data Explorer

Table 8: An overview of temperature change (oC) projected Timor-Leste over different time horizons, emissions pathways, and measures of temperature, showing the median estimates of the full CCKP model ensemble and the 25th, 50th and 75th percentiles. Source: The World Bank Group Climate Change Knowledge Portal (CCKP). Climate Data: Projections. 2019. <https://climateknowledgeportal.worldbank.org/country/timor-leste/climate-data-projections>.

Scenario		Annual average of monthly maximum		Annual average		Annual average of monthly minimum	
		2036-2065	2066-2095	2036-2065	2066-2095	2036-2065	2066-2095
RCP4.5	25th	0.86	1.18	0.79	1.09	0.72	1.00
	50th	0.95	1.29	0.92	1.26	0.96	1.23

	75 <sup>th</sup>	1.14	1.58	1.19	1.58	1.10	1.54
<b>RCP8.5</b>	25 <sup>th</sup>	1.19	2.26	1.24	2.25	1.23	2.24
	50 <sup>th</sup>	1.33	2.60	1.30	2.47	1.33	2.46
	75 <sup>th</sup>	1.59	3.00	1.56	2.93	1.55	2.94

**Sea-level rise:** To mid-century, mean sea level rise follows a similar trajectory regardless of whether RCP4.5 or RCP8.5 is used, with a mean increase of 25cm, and increases of 37cm at the top of the range of projections. Beyond that there is significant divergence; the mean value for the higher emissions RCP8.5 shows an increase of 80cm by 2100, while the mean value for RCP4.5 is 58cm. Even under the lower emissions scenario, increases of just over 80cm are possible, while in the high emissions scenario sea level rise could exceed 1m. Recent research and modelling of sea level rise has tended to increase the amount of sea level rise expected, as a result of improved understanding of ice sheet dynamics[8], so from a risk assessment perspective, it may be prudent to assume higher values.

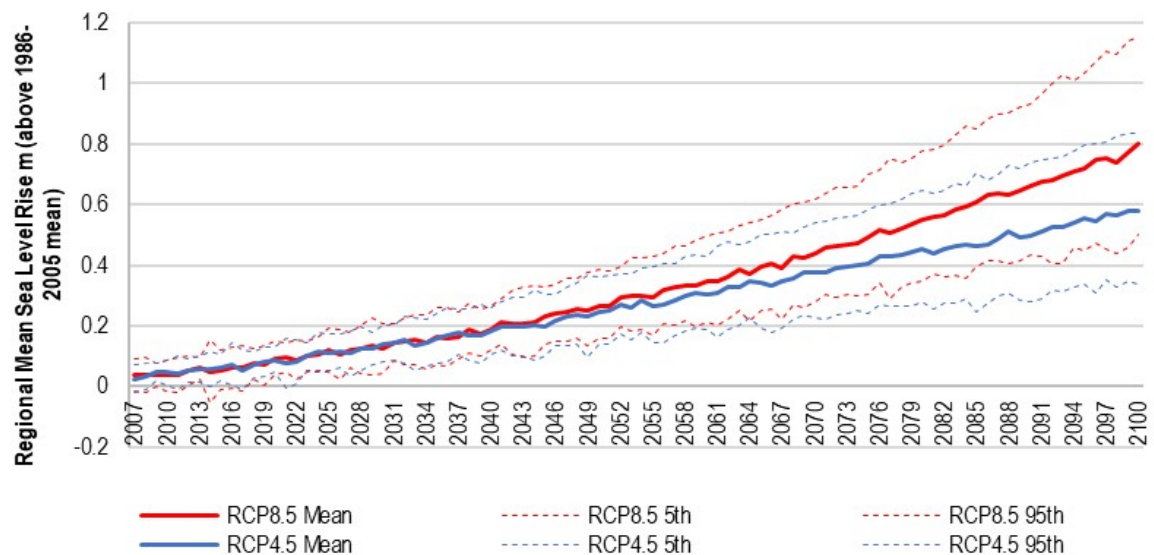


Figure 21: Mean Sea Level Rise to 2100 for Timor-Leste

**Wind driven waves** The wind-wave climate of Timor-Leste is strongly characterised by the West Pacific Monsoon winds in December to March and south-easterly trade winds in June to September. Wind-waves around Timor-Leste are quite small, typically less than one metre high. At Dili on the north coast, slightly larger than average waves are directed from the east-northeast during June to September

**Ocean acidification.** About one quarter of the carbon dioxide emitted from human activities each year is absorbed by the oceans. As the extra carbon dioxide reacts with seawater it causes the ocean to become slightly more acidic. This impacts the growth of corals and organisms that construct their skeletons from carbonate minerals. These species are critical to the balance of tropical reef ecosystems. Data show that since the 18th century the level of ocean acidification has been slowly increasing in Timor-Leste's waters.

**Natural hazards.** According to the World Risk Report, which generates rankings based on exposure and vulnerability to Natural Hazards, Timor-Leste ranks 20<sup>th</sup> globally (24<sup>th</sup> in exposure, 51<sup>st</sup> in vulnerability (of which 43<sup>rd</sup>, 42<sup>nd</sup> and 82<sup>nd</sup> in susceptibility, lack adaptive capacity and lack coping capacity)[9]. Floods, droughts, landslides and cyclones are the major natural hazards. Flooding is the most frequent disaster, with riverine and flash flooding occurring during periods of extreme rainfall; significant flood events were recorded in 2001, 2003, 2006, 2013, 2019 and 2020[10]. Flood risk is expected to increase in the future as extreme rainfall events become more common, and the increasing population means that more people live in flood-prone areas. Cyclones also lead to flooding; however, these are more common in the east of the island and usually have a low impact whilst passing Timor-Leste. Nonetheless, cyclones are likely to increase in frequency due to climate change.

The result of the initial climate risk screening included in The Rapid Environmental Assessment is **medium** due to seaweed production being susceptible to weather-based events such as storms. Mitigation measures include introducing production techniques that are less affected by flood risks and wave action.

#### *Environment and Social Safeguards*

The Rapid Environmental Assessment identified that seaweed cultivation would take place in legally protected areas, specifically Marine Protected Areas already established in Atauro and a planned one in Metinaro. Both areas are also home to mangrove forests. However, the project will be implemented using the EAA methodology, preventing any negative environmental impacts. Socially, seaweed cultivation can involve community safety risks due to drowning and crocodile attacks.

According to the ADB SPS 2009, the project may fall under **Category C** as it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications will need to be reviewed.

#### *Other safeguards*

Involuntary resettlement policy - no resettlement is planned as part of this project.

Indigenous peoples policy - Timor-Leste does not recognise the term 'indigenous' to describe its people.

Pest management policy - The planned project does not include pest management practices.

Physical cultural resources policy - Significant impacts to physical cultural resources are not envisaged on the project.

Stakeholder engagement - Inclusive and participatory stakeholder engagement will be critical for the success of the project.

Gender mainstreaming - Gender empowerment will be integrated throughout the project.

Project contribution to COVID-19 pandemic recovery: **Build back blue?**

The fragility of the global food system has been tested during the Covid 19 pandemic. The food system and respective supply chains operate on the razor's edge of food system function and food system collapse. Without contingency plans for widespread logistical disruptions, shortages in human labour, disease spread amongst workers and labourers, and more economic safety nets for the most vulnerable, the same challenges will resurface during the next pandemic which is inevitable.

Supply chain disruption and logistical backlogs are a result of a food system that has no contingency plan(s). Furthermore, much of the supply chain structure is based on relationships, traditions, inequalities of power, side deals, fraud, substitution, quality disincentives, traceability and transparency disincentives, and margins that cannot even sustain a livelihood.

The opportunity to **build back blue**? in the Indonesian shrimp sector and the Timor-Leste seaweed sector present great opportunities to take stock of what has transpired in the pandemic and what could have or should have been done to safeguard supply chains and the people that work in them. Key aspects of building back blue in supply chains and specifically the Indonesian shrimp and Timor-Leste aquaculture sectors are:

- a. Equity in value chains for wealth sharing that affords a living wage that can cushion workers in times of pandemics
- b. Product origin laws for farm species and feed ingredients which support rapid response to diseases of humans and animals
- c. Widespread understanding of the fundamental ways that viruses and bacteria infect and cause disease in humans and livestock
- d. Separation of livestock from humans and segregation of one species of livestock from another
- e. Migrating off the dependency of unapproved drugs and chemicals for undiagnosed animal ailments
- f. Importation testing and clear coupled with 'trace backs' to ensure imported goods can be effectively traced back to its origin
- g. Linking climate change and new disease threats and better predictive analytics to spot trends and share information rapidly across countries
- h. Creating national strategies and early warning systems that can integrate with other neighbouring countries to be provided adequate advance notice of animal or human diseases
- i. Creating space for nature to recover and provide a buffer zone for the zoonotic spread of novel pathogens
- j. Increasing incomes more broadly to reduce bushmeat consumption and trade
- k. Elimination of non-domesticated pets from the wild
- l. Reducing human-wildlife conflict through ecological corridors and the recognition that nature is an asset that must be preserved for human protection.

As the food system is so fragile, COVID-19 has alerted us to the needs to protect this system and life on Earth. We need to heed these warnings and incorporate them into all development projects for the sustainability of life and project outcomes.

---

[1] Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K., ... & Miller, H. (2007). IPCC fourth assessment report (AR4). Climate change,

374.[https://www.ipcc.ch/site/assets/uploads/2018/03/ar4\\_wg3\\_full\\_report-1.pdf](https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg3_full_report-1.pdf)

[2] Triana, K. (2020). Sea Level Rise in Indonesia: The Drivers and the Combined Impacts from Land Subsidence. ASEAN Journal on Science and Technology for Development, 37(3), 115-121.<https://ajstd.org/index.php/ajstd/article/view/627/525>

[3] Abidin, H. Z., Andreas, H., Gumilar, I., Fukuda, Y., Pohan, Y. E., & Deguchi, T. (2011). Land subsidence of Jakarta (Indonesia) and its relation with urban development. Natural hazards, 59(3), 1753-1771.[https://www.researchgate.net/publication/237757739\\_Land\\_Subsidence\\_and\\_Urban\\_Development\\_in\\_Jakarta\\_Indonesia](https://www.researchgate.net/publication/237757739_Land_Subsidence_and_Urban_Development_in_Jakarta_Indonesia)

[4] United States Agency for International Development. *Timor-Leste Climate Risk Profile*. 2017.

[5] Government of Timor-Leste. *Timor-Leste Disaster Management Reference Handbook*. 2019

- [6] USAID (2017) Timor-Leste Climate Risk Profile  
[7] Timor-Leste National Adaptation Programme of Action (NAPA)  
[8] See IPCC. 2019. Special Report on the Ocean and Cryosphere in a Changing Climate; Garner *et al.* 2018. *Evolution of 21st Century Sea Level Rise projections. Earth's Future* 6(11): 1603-1615.  
[9] <https://weltrisikobericht.de/english/>  
[10] Timor-Leste Disaster Risk Management Handbook. 2019.

## **6. Institutional Arrangement and Coordination**

**Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.**

GEF Agency: The ADB as GEF Agency will provide oversight and direction in line with ADB policies, as well as GEF Fiduciary Standards, GEF Minimum Standards for Environment and Social Safeguards, GEF Policy on Program and Project Cycle Management and others.

### GEF Executing Entities:

Indonesia: Ministry of Marine Affairs and Fisheries (MMAF) and Ministry of National Planning and Development (BAPPENAS)

Timor-Leste: Ministry of Agriculture and Fisheries (MAF)

**Project Coordination Committee:** Will include representatives from the GEF Executing Entities, include *ad hoc* representation of other international organizations (e.g. WorldFish) or private sector on case by case basis, and be established in coordination with FAO (as lead GEF Agency for ISLME SAP preparation).

Below is an illustration of the proposed institutional arrangements which will feature the Project Coordination Committee (aligned with FAO-ISLME) and a partnership coordination group.



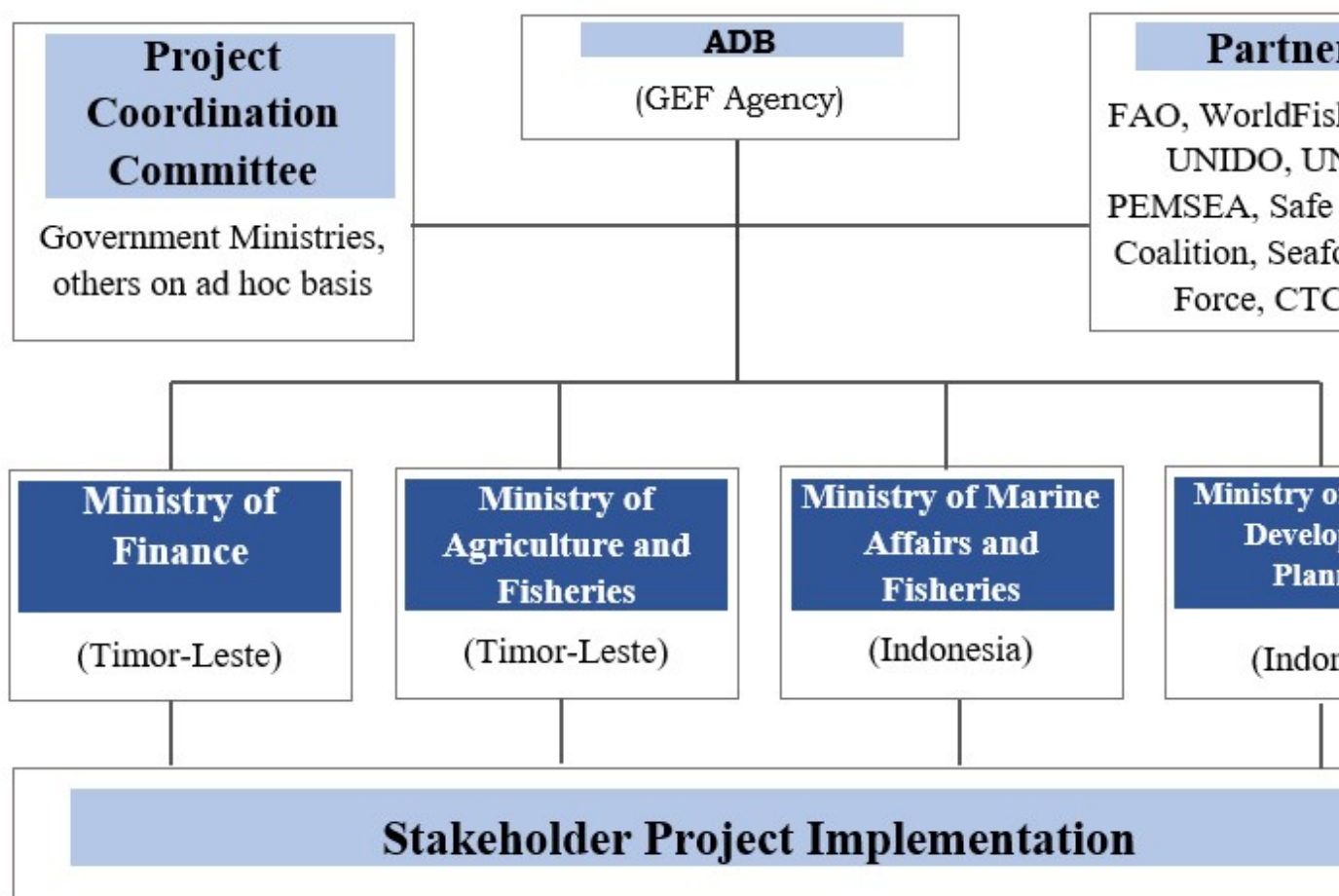


Figure 22: Provisional institutional coordination structure

#### Roles of GEF Executing Entities

In Indonesia, the Ministry of Marine Affairs and Fisheries Kementerian Kelautan Dan Perikanan Regulation of the President No. 63/2015 lays out the roles and responsibilities of MMAF. The respective roles of the National Development Planning Agency are laid out in Presidential Regulation No. 20/2016 Amending Presidential Regulation No. 66/2015 for the National Development Planning Agency. The Indonesia Climate Change Trust Fund (ICCTF) was established under the BAPPENAS Ministerial Regulation No. 3 of 2013. The allocation of resources and lead agencies took lengthy debate, and based on confirmation from the GEF Secretariat the respective agency would lead a particular output based on their legal mandate, roles and current staffing. These are identified in the Alternative Scenario narrative for each output. While there will be a lead Executing Partner for each Output, the other Executing Partner may have some supporting role depending on the nature of the work. The project budget below, provides details on the grant amounts allocated for each output, with colour coding according to the Executing Partner. Each Indonesian Executing Partner will have a project implementation unit with coordinator, finance and administrative support for day to day operations. During inception more detailed operational coordination will be worked out between MMAF and BAPPENAS.

The Ministry of Finance (MOF) was included at the request of the Government of Timor-Leste. For all donor funded projects the Ministry of Finance is the signatory for any agreements. The MOF then delegates implementation to the relevant ministry, which in this case is MAF. The inclusion of MOF in the PCS is offered in courtesy should they wish to participate. Funds have been allocated to recruit a Project Coordinator to work within MAF and manage the day-to-day management of the project.

In Timor-Leste, funds and contracts will be managed by ADB. Funds have been allocated to recruit a Project Coordinator to work within MAF and manage the day-to-day management of the project.

#### ***Coordination with other GEF-projects and other initiatives:***

The project will coordinate with GEF and non-GEF projects being implemented in relevant countries, focused on coastal and marine resource management. It will build on key baseline projects and initiatives (see the section on the baseline) and coordinate with key stakeholders and partners (see stakeholder section) to: i) benefit from lessons learned; and ii) effectively leverage relevant activities to maximise efficiency and impact.

In particular, the project will coordinate with and ensure integration with a number of key investments by GEF and other multilateral organizations. During PPG direct associations with WorldFish Centre, SEAFDEC, Commonwealth Scientific and Industrial Research Organization (CSIRO), Wildlife Conservation Society, New Zealand Aid, USAID, FAO and others will be elaborated. Below is information on proposed coordination with GEF supported initiatives:

GEF ID 2700: ?Implementation of the Sustainable Development Strategy for the Seas of East Asia? (SDS-SEA) (PEMSEA) (closed)

The project aims to coordinate closely with the PEMSEA Resource Facility (PRF), and benefit from: i) extensive adoption of ICM policy in practice in the two countries, ii) PEMSEA ICM Learning Centres, iii) PEMSEA Network of Local Governments, iv) links to non-Country Partners, such as Plymouth Marine Laboratories for science-based services, v) lessons drawn from PEMSEA-linked sub-projects in the aquaculture sector, and vi) PEMSEA's regional convening power through its various knowledge and communications platforms, including the EAS Congress.

GEF ID 4452: ?Standardized Methodologies for Carbon Accounting and Ecosystem Services Valuation of Blue Forests,? which has produced assessments of carbon and ecosystem services associated with ?blue forests,? including seagrass meadows. The project will build on the knowledge, methodologies, and best practices of the project.

GEF ID 5171: COREMAP CTI ? Among the key outputs for the restructured GEF project in Indonesia are: i) MPA management plan implementation enhanced in 3 MPAs (Gil Balu, Gili Matra, and Nusa Penida); ii) Investments in community-based ecosystem restoration/rehabilitation and monitoring (including mangroves and coral reefs), iii) Sustainable fisheries and livelihoods promoted in project areas (tuna, snapper, and seaweed).

- GEF ID 10573: ?Blue Horizon: Ocean Relief through Seaweed Aquaculture?. The current GEF project proposes to link directly with this WWF initiative in Viet Nam and the Philippines. This is elaborated under Outcome 3.1 ?Seaweed aquaculture and capture of nutrients from the ocean expanded?. There will be cross-learning and sharing between the three countries and close synergies developed across the two GEF projects, with respect to ecosystems services generated from seaweed aquaculture, and piloting these systems in non-nearshore coastal areas.

- GEF ID 6920: ?Implementation of the Arafura and Timor Seas Regional and National Strategic Action Programs? (ATSEA -2)

-

The proposed GEF project addresses directly, the Ecosystem Quality Objective of the ATSEA SAP as it relates to 'Recovering and sustaining fisheries' including both Operational Objectives: i) To promote responsible fishing practices, including combating IUU fishing, and ii) Understand and address the ecological impacts of fisheries. It is relevant to Target 1.2, to apply the Ecosystem Approach to Fisheries Management, and supporting actions to reduce stress on marine and coastal ecosystems. The GEF project will engage with the ATSEA through links with the RPOA-IUU (See below), the ATSEA Coordinating Committee, and the Stakeholder Partnership Forum.

GEF ID 5768: 'Enabling Transboundary Cooperation for Sustainable Management of the Indonesian Seas' (ISLME)

The proposed GEF project will align closely with the above project for which FAO is the GEF Agency, and the MAF and MMAF are key executing entities in the respective countries. The ISLME project is still in the process of Transboundary Diagnostic Assessment (TDA) preparation. Thematic studies are being finalized in both countries. Causal Chain Analysis (CCA) under the TDA development suggests that the proposed ADB/GEF project will fall under the Priority Environment Concern (PEC) related to 'unsustainable fisheries and aquaculture'.

The ADB/GEF project will coordinate with FAO and the Government counterparts to ensure that this proposed GEF project is considered under the transboundary institutional coordination mechanism 'an inter-Ministerial Committee - which is the early stages of conceptualization and eventual strengthening during the SAP development process (along with ATSEA-2). During project preparation, the links between this GEF project and the emerging SAP framework will be strengthened, particularly in terms of identifying and qualifying areas for additional technical assistance and/or investment.

????

## **7. Consistency with National Priorities**

Describe the consistency of the project with national strategies and plans or reports and assessments under relevant conventions from below:

NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

The proposed project is aligned with the strategies and plans described in the below.

### CTI-CFF Regional Plan of Action (RPOA)

The CTI-CFF Regional Plan of Action from 2009 has been reviewed and a newer, updated version is being considered by the CT Member Countries, with support from the Development Partners (which includes ADB and the GEF, among others). Under the current RPOA, the proposed GEF project is relevant to Goal 2: 'Ecosystem Approach to Management of Fisheries (EAFM) and other marine resources fully applied', specifically: i) Target 1: Strong legislative, policy and regulatory frameworks in place for achieving an Ecosystem Approach to Fisheries Management (EAFM) and ii) Target 2: Improved income, livelihoods, and food security in an increasingly significant number of coastal communities across the region through new sustainable coastal fisheries and poverty reduction initiative ('COASTFISH').

### Regional Plan of Action on Illegal, Unreported and Unregulated Fishing (RPOA-IUU)

The project concept is consistent with the main pillars of the RPOA-IUU, including Section 5 on 'Coastal State Responsibilities'. Section 5.1 states: '...countries in the region should: i) work together to improve their data collection systems and to share information about vessels, fishing effort, catch levels, fish landings and sales of fish and fish products, as appropriate' Section 6 on control of fishing capacity and fishing

effort, mandates that countries should ? [introduce] management measures to help prevent fishing capacity from exceeding levels that result in harvest rates that impede the ability of fish stocks to reproduce sustainably over the longer term.? The proposed project concept is also consistent with Section 11 on ?Monitoring, Control and Surveillance (MCS) which encourages national and regional cooperation, coordination and sharing of information.[1]

Among key updates at the 13<sup>th</sup> RPOA-IUU Coordination Committee (CCM) Meeting in November 2020, Indonesia reported that it has implemented measures for tracing fisheries products through Catch Certification System and electronic logbook (e-logbook).[2]

#### Indonesia National Aquaculture Strategy

The RPJMN, 2020-2024, which completes the National Long-Term Development Plan (RPJPN), 2005-2024, establishes the goal of achieving prosperous, fair, and sustainable development by 2024.[3] The government's policy priorities include persistent efforts to accelerate the development of human capital, improve infrastructure and connectivity, simplify regulations and bureaucracy, and promote economic transformation. To close the infrastructure gap, the government plans to mobilize \$450 billion in infrastructure development under the RPJMN. The RPJMN includes targets that represent a continuation and acceleration of current progress, rather than a major change in trend. The adverse impact of COVID-19 means that the topline goals of the RPJMN may be difficult to achieve. The government has established a taskforce on COVID-19 response and economic recovery, which prioritizes health care and social protection systems as well as economic support measures.

The Indonesia National Aquaculture strategy is aligned with the National Mid-Term Development Planning 2020-2024. The strategic plan sets three main goals for 2020-2024 namely: (1) sustainable area management; (2) sustainable improvement of aquaculture production; and (3) cultivators welfare improvement. These goals are then translated into 15 strategies for Indonesia Aquaculture development including: (i) Acceleration of the aquaculture production through intensification and extensification of aquaculture ponds; (ii) Revitalization/development of shrimp and milkfish ponds; (iii) Development of aquaculture product with high economic value; (iv) development of independent fish feed consisting of artificial feed and natural feed; (v) Development of a national fish hatchery system through the strengthening of the national hatchery network or logistics system, development/rehabilitation of facilities and infrastructure for fish seed centres, fish hatchery units in the community, and broodstock centres, as well as technological modernization.

The ADB loan for reforms to the shrimp aquaculture sector coupled with the project to link and track shrimp feeds and ingredient origins is part of the national plan to accelerate and increase shrimp aquaculture exports. These interventions in shrimp supply chains will create access to newer and potentially higher value markets, thus well-aligned with the ambitions of the Indonesian government.

#### Timor-Leste National Aquaculture Strategy

Timor-Leste's Strategic Development Plan (SDP) 2011-2030 is aligned with the United Nations Millennium Development Goals and provides an integrated package of strategic policies to implement over different periods (1-5 years, 5-10 years, and 10-20 years) toward the country's prosperity. The SDP consists of three key areas and objectives: (1) build social capital for a healthy and educated society, (2) become a connected, sustainable, and growing nation by developing core and productive infrastructure, and (3) enhance economic development to achieve a modern and prosperous nation.

The Timor-Leste government has identified aquaculture as a potential initiative that needs to be developed as it can contribute to improving food and nutrition security and provide job opportunities for inland as well as coastal communities. It is important for aquaculture farmers to understand and recognize this initiative as an integral part of the effort to improve their nutritional status and increase their household income. Developing aquaculture is in line with the priorities of the Timor-Leste Strategic Development Plan (2011-2030), which aims to diversify livelihood opportunities. The Timor-Leste National Aquaculture Development Strategy (NADS) 2012-2030, which was developed by the Ministry of Agriculture and Fisheries

(MAF) seeks joint ventures between government, INGOs, NGOs and the private sector to realize its success. Further, the Plan identified key aspects of seaweed aquaculture to be enhanced as follows:

1. Developing Agar-Agar, kappa- carrageenan, and other high value seaweed products
2. Emphasis on Eucheuma farming technology with a variety of system types (bottom monoline, floating bamboo, net-bag technique, etc.)
3. Investments in semi-intensive and intensive systems
4. Promoting research and development of seaweed to meet consumer needs and applications of carrageenan
5. Development of industrial-scale seaweed with integrated value chains

As the project is intended to focus on post-harvest handling, quality control and market access, it is aligned with the national strategies for Timor-Leste on aquaculture.

????

---

[1] [https://www4.fisheries.go.th/local/file\\_document/20170403165758\\_file.pdf](https://www4.fisheries.go.th/local/file_document/20170403165758_file.pdf)

[2] <https://www.rpoaiuu.org/the-13th-rpoa-iuu-coordination-committee/>

[3] Government of Indonesia. 2020. National Medium-Term Development Plan (RPJMN) 2020-2024. Jakarta; and

Government of Indonesia. 2005. National Long-Term Development Plan (RPJPN), 2005-2024.

Jakarta. <https://www.indonesia-investments.com/projects/government-development-plans/national-long-term-development-plan-rpjp-2005-2025/item308#:~:text=The%20RPJPN%2C%20a%20development%20plan,in%20pace%20with%20other%20nations.>

## **8. Knowledge Management**

**Elaborate the "Knowledge Management Approach" for the project, including a budget, key deliverables and a timeline, and explain how it will contribute to the project's overall impact.**

### **Knowledge Management and Learning**

The "Knowledge Management Approach" for the project is a core pillar of the project and is the approach that allows for scaling and amplifying the project's overall impact across TL and INO, but also sharing in global forums and events such as IWLEARN and global aquaculture and aquaculture feed events. ????

There is no "one size fits all" approach to knowledge management (KM), or singular toolbox of techniques. A knowledge management framework is bespoke, tailored to the circumstance, context and time.

Below are some key principles to inform and guide the KM framework design and guide its implementation.

1. KM is aligned with the major elements of the project.

The KM activities will ensure implementers of this project improve their performance and learn from project implementation. The knowledge is to help all stakeholders make better decisions, feel more engaged, connected, supported and contributing to the primary goals and objectives of a project. KM provides linkages between creation, curation and flows to various end users.

2. KM will involve content and connectivity with the project being the knowledge generator and user. This approach requires i) timely generation of knowledge, ii) ways to validate accuracy of knowledge provided, iii) methods to organize or curate knowledge, and iv) multimedia methods to transfer knowledge to appropriate users.

3. KM will be targeted to specific end users at the appropriate time it is needed. The KM needs to fit the objectives of the project and ensures it reaches the key audiences in the appropriate form which is usable or actionable. It also needs to reach the targets through a variety of means, such as i) multimedia (print, broadcast, web, traditional story-telling), ii) experiential learning by doing, iii) demonstrations and pilots, iv) policies, incentives and removal of barriers that encourage their adoption.

4. The KM will function as a collection of materials and work with a "community of practice" including government and non government thought leaders, influencers, community stakeholders, shrimp farmers and feed mills, as well as seaweed farmers, women and different sectors.

5. The KM must be embedded throughout the project, rather than as a stand-alone effort and promote participation, inclusion and learning across all stakeholders, vertically and horizontally. Knowledge management will be supported under Component 5 of the project. Lessons learned, best practices, and guidance notes for scaling up will be collated and disseminated according to a communication strategy developed during project development. Digital publishing will be prioritized as a method of dissemination.

The project will fully participate in IW:LEARN and knowledge management / communications, this includes regular attendance in virtual conferences, regional meetings and at least one GEF international Waters Conferences to deliver IW:LEARN experience notes for both Indonesia and Timor-Leste. The Knowledge Management Strategy is articulated below in Table 10.

Table 10: Knowledge Management Strategy

**Knowledge Management Strategy**

OUTCOME / OUTPUT	ACTIONS WITH KNOWLEDGE MANAGEMENT ELEMENTS	Provisional Budget (US\$)	Anticipated Timing

<p><b><u>Outcome 1.1</u></b></p> <p>Output 1.1.1: Indonesia - National Action Plan for Shrimp Aquaculture adopting Ecosystems Approach to Aquaculture (EAA[1])[2] including climate change mitigations and resiliency prepared through multi-stakeholder consultations - to increase the environmental sustainability of the shrimp aquaculture sector executed.</p> <p>Output 1.1.2: Marketing and business plan for renovated shrimp sector for greater magnitude of market reach developed</p> <p>-</p>	<p>Suite of 15 knowledge products prepared (preference for digital files) to improve shrimp feed supply chains as a package, targeting each audience across the supply chain raw material sourcing, to feed mills and feed suppliers, to farmers, processors, exporters and to international audiences, Government and food safety agencies, importers, food service industry, supermarkets and ultimately consumers. Explaining the reforms taking place, the continuous improvement systems and how it impacts the supply chain.</p> <p>Plan published and disseminated into KKP Key Performance Indicators, and RPJM 2025-2029 (Medium term development plan)</p> <p>Marketing plan products targeted to each audience in the whole supply chain.</p>	<p>186,190</p>	<p>Q2-3 Year 2</p>
<p><b><u>Outcome 1.2</u></b></p> <p>Output 1.2.1: National Seaweed Aquaculture Strategy prepared through multi-stakeholder consultations - aligned with National Aquaculture Development Strategy to increase the environmental sustainability and ecosystem services of the seaweed sector</p>	<p>Comprehensive baseline study of seaweed production completed in Timor-Leste which can also be used by NDFA for M&amp;E purposes</p>	<p>40,000</p>	<p>Q1/2 Year 2</p>

<p><b><u>Outcome 2.1</u></b></p> <p>Output 2.1.1: Two convenings of the Indonesian government, feed, and processing sectors to be trained on requirements to access markets of the Seafood Task Force (STF) (Indonesia)</p> <p>Output 2.1.2: Mass balance inspection protocol to validate feed to shrimp tracking generated (Indonesia)</p> <p>Output 2.1.3: Shrimp feed action plan developed. System requirements for feed-to-shrimp tracking co-created by Government and Industry, and supported by a roadmap and execution timeline ? with links to National Action Plans for Shrimp Aquaculture (Indonesia)</p> <p>Output 2.1.4: Five supply chain pilot validation exercises to refine and improve feed to shrimp tracking system supported (Indonesia)</p> <p>-</p>	<p>Data collection system for shrimp feed tracking methodology to systematically collect data on the shrimp feed supply chain. The information system will be created in partnership with the STF partners and digitized to serve as data analytics for an array of knowledge and decision-support functions. The data will form a database of different ingredients being used in the Shrimp feed formulation</p> <p>Suite of knowledge products (printed) for all stakeholders working in the shrimp feed supply chain that identifies best practices in shrimp feed traceability and dissemination of the supply mass balance protocol and tracking .</p> <p>Quantification of environmental burdens of shrimp feed, as well as supporting the dissemination of the shrimp-feed supply mass balance protocol and tracking</p> <p>Definition of trash fish and policies aligned with outputs of the project.</p> <p>Suite of knowledge products for all stakeholders that supports the dissemination of the definition and policy on trash fish, its real costs, and identifying the species and trade-offs in its use</p> <p>Research-based knowledge product will be prepared and disseminated articulating the Mass Balance protocol, including at least two case studies on early adopters</p> <p>Produce a guide to responsible shrimp feed sourcing in partnership with the STF</p> <p>Produce a guide for best practices for traders sourcing ingredients for shrimp feed</p> <p>Full process documentation of the application of the mass balance protocol, with a step by step guide that other companies can easily adopt</p>	<p>357,000</p>	<p>Q3/4 Y3-5</p>
---	---	----------------	------------------



	<p>Suite of knowledge products (printed) prepared to improve shrimp feed supply chains. This includes market studies, traceability principles, standards, and best practices, and the roadmap and execution timeline.</p> <p>Shrimp tracking system tested, documented and Dissemination will be through workshops, seminars, on-farm field trials, and cooperative education activities. Audio-visual productions will be prepared and shown through a range of broadcast and web-enabled methods.</p>		
<p><b><u>Outcome 3.1</u></b></p> <p>-</p> <p>Output 3.1.1: Quantification of ecosystem services through methodologies developed by the GEF 7 Blue Horizons seaweed project and adopted in Timor-Leste</p> <p>Output 3.1.3: Policy and Regulatory gap framework analysis from GEF 7 Blue Horizon project adopted and applied to Timor-Leste</p>	<p>Manual prepared on how to quantify ecosystem services applicable to seaweed, which may be used for the calculation of carbon credits in the future by MAF and carbon credit traders</p> <p>Manual prepared on how to analyze policy and regulatory gaps which can be used by MAF for other crops/sectors</p>	3,150	Q2/3 Y3-4
<p><b><u>Outcome 3.2</u></b></p> <p>-</p> <p>Output 3.2.1: Sustainable marine resource management and planning demonstrated in Atauro and Metinaro. __</p> <p>-</p> <p>Output 3.2.2: Improved production and post-harvest handling techniques demonstrated in Atauro and Metinaro</p>	<p>EAA methodology developed in a manual that can be used in other seaweed growing areas by local authorities where applicable.</p> <p>Extension materials prepared for use by extension workers and seaweed farmers</p>	150,000	Q3, Y3

<p><b><u>Outcome 4.1</u></b></p> <p>Output 4.1.1: Seaweed farmer groups strengthened to aggregate and store RDS</p> <p>Output 4.1.2: Traders and seaweed farmer group leaders trained in contract brokerage and export procedures</p> <p>Output 4.1.3: Seaweed traders and farmer group leaders network with international buyers</p> <p><b><u>Outcome 4.2:</u></b> Engagement of Indonesian shrimp industry leadership/associations with the Seafood Task Force (STF)</p>	<p>Manual prepared for seaweed farmer groups including modules on organization, planning, drying, storage, transport, packaging, and marketing</p> <p>Manual prepared for traders and seaweed farmer group leaders to facilitate improved market linkages</p> <p>Database of seaweed farmer groups, seaweed traders, and international buyers created for further networking opportunities</p>	<p>45,000</p> <p>(Outputs 4.1.1 to 4.1.3 )</p>	<p>Q3, Y4</p>
<p>Output 4.2.2: Feed/shrimp tracking program action plan communicated/socialized and implemented at project sites (Indonesia)</p> <p>Output 4.2.3: Supply chain renovations of shrimp traceability, broodstock and hatchery facilities, controlled intensification of farms and product quality and safety controls demonstrated in 5 buyer visits to renovated sites will inform business and marketing plans for greater market access.</p> <p>-</p> <p>-</p>	<p>—</p> <p>Suite of knowledge products (printed) for all stakeholders working in the shrimp feed supply chain that identifies best practices in shrimp feed traceability and dissemination of the supply mass balance protocol and tracking</p> <p>Data collection system for feed /shrimp tracking designed. The systematic collection will serve as the backbone of activities for this Outcome, allowing for easy replication and scaling. The information system will be created through inclusive, participatory methods and digitized to serve as data analytics for an array of knowledge and decision support functions.</p> <p>KPs will also include systematic documentation, step by step, of the technical assistance and investment involved in creating a successful KPs will also include systematic documentation, step by step, of the technical assistance and investment involved in creating a successful traceability system</p> <p>Establish early adopters and pilot supply chains as show and tell sites to support demonstration workshops, seminars and cross-visits for feed mill association members and feed materials sourcing traders</p>	<p>102,000</p> <p>(Outputs 4.2.2 and 4.2.3)</p>	<p>Q3/4 Y4</p>

-	<p>Produce a series of multimedia knowledge products and learning materials, including ?how to? guides</p> <p>Conduct behavior change campaign targeting farmers, extensionists and industry stakeholders on the benefits of fully traceable feed ingredients and proper sourcing, documentation, and protocols.</p> <p>Peer-to-peer interaction with field cross visits across multiple sites - with possible creation of a ?community of practice on feed supply chain traceability</p> <p>Identify learning opportunities for feed source suppliers, shrimp farmers, extension workers, STF member companies, and other stakeholders.</p>		
<p><b>Outcome 5.1:</b> Full participation in IW: LEARN and knowledge management/communication</p> <p>-</p>	<p>Knowledge sharing between STF members across Asia-Pacific, with sharing between Indonesian and Thailand feed mills promoted through international conferences and workshops</p> <p>Useful international insights and experiences from IW: LEARN integrated into the manuals described above (Timor-Leste).</p>	343,000	Q3, Y2 and Q3 Y5
<p><b>Outcome 6 M&amp;E</b></p> <p>Output 6.1 MTR and TER conducted</p>	<p>Conduct a mid-term review (MTR) to provide early insights on project structure and operations and guide decisions on project implementation course corrections.</p> <p>Terminal Evaluation captures overall lessons learned and is shared across various ADB and GEF platforms and portals and STF member countries and partners</p>	100,000	Q2 Y5
Total		1,326,340	

The project will leverage existing lessons and experiences to inform the project implementation and beyond. This approach recognizes the value of building on the knowledge and expertise that already exists in the field, rather than starting from scratch. The project team will conduct a thorough review of relevant literature, case studies, and best practices to identify successful approaches and strategies that can be adapted and replicated in the project.

Additionally, the project team will actively seek opportunities to learn from ongoing relevant projects and activities. This will involve collaborating with other organizations and stakeholders articulated in the stakeholder section in the field to share knowledge and best practices. The team will participate in relevant networks, communities of practice, and working groups to stay up-to-date with the latest developments and insights in the field, including but not limited to the other GEF projects and partners working in ISLME.

To support knowledge exchange, learning, and collaboration within the project, the team will identify proposed tools and methods. This will include developing a knowledge management system to capture and disseminate project learnings, facilitating regular meetings and workshops to share experiences and best practices, and utilizing online platforms to enable virtual collaboration and knowledge sharing.

The knowledge and learning generated through the project will be critical to its impact and sustainability. By leveraging existing knowledge and building on successful approaches, the project team will be able to design and implement interventions that are more effective and efficient. The ongoing learning and collaboration within the project will also enable the team to adapt and adjust their approach as needed, ensuring that the project remains relevant and impactful over time. Ultimately, the project's impact and sustainability will depend on its ability to generate and utilize knowledge effectively, and the project team is committed to this goal. The role of IE:LEARN is critical to ensure an institutional repository for all the lessons and learning.

### **Communications and Visibility**

The project will adhere to the emerging GEF New Communications and Visibility Policy as well as the new Branding Guidelines.

Activities and products related to knowledge management and learning, shall be coordinated with the ADB/GEF coordination team to ensure impact and safeguarding of the GEF brand ? and where necessary with the GEF Communications team.

Each Executing Partner shall have a communications focal point(s) who can liaise with the ADB-GEF coordination team, the ADB Department of Communications and the GEF Communications team where appropriate.

During project inception the implementation team as well as the counterparts within each Executing Entity will be briefed on the GEF policy and guidelines. Outreach plans that relate to communication objectives, target audience(s), channel(s), messaging, and measurement (which could include analytics or survey data) will be discussed and documented. Internal team communications will also be discussed to ensure smooth task implementation and coordination across activities and stakeholders.

External communication about the project will include information about results, impact, and contributions to return on investment, where possible, with human-centered storytelling as a key feature - for example how a family engaged in seaweed cultivation in Metinaro, Timor-Leste has benefitted, or how a small-scale shrimp farmer is able to internalize good aquaculture practices in Indonesia with respect to feed ingredients, and improve exportability of his/her product etc.

Publications such as brochures, magazines, and books shall incorporate the latest boilerplate text describing the GEF. Digital publications will be encouraged under this project, and will be shared with the GEF communications team for awareness and amplification on the GEF website and social media platforms as appropriate.

Project media relations, press releases, audio-visual productions, promotional items, social media posts etc will all conform to the GEF policy, be discussed as part of project work plan development and execution, and be reviewed in advance by the ADB/GEF coordination team as well as the GEF Communications team as needed.

## 9. Monitoring and Evaluation

### Describe the budgeted M and E plan

Activity	Description	Responsible	Timeframe	Budget
Project Plan  Report prepared  - Minutes of the Inception  Workshop  One report to be prepared following the launch, to be shared with participants within 6 weeks after GEF implementation begin	includes:  - A detailed workplan and budget for the first year of project implementation,  - An overview of the workplan for subsequent years, divided per component, output and activities.  - A detailed description of the roles and responsibilities of all project partners  - A detailed description of the Project Management Units (PMUs), Project Steering Committee (PSC), and Indonesian and Timor-Leste Technical Advisory Groups (TAGs),  - Updated Procurement Plan and a Monitoring & Evaluation Plan, Gender Action Plan	PMUs in Indonesia and Timor-Leste, in consultation with Senior Technical Advisor (s) and ADB Operational Department / Resident Missions; and support from ADB/GEF Coordination unit	Within three months of project inception	

Project Steering Committee  and  Technical Advisory Group Meetings	Prepare minutes for every Project  Steering Committee and Technical Advisory Group Meetings	Project Coordinators within the PMUs	At least 1 per year per country and 1 per year for the whole implementation team within ISLME framework (possibly coincide with ISLME Coordination Committee meetings)  Minutes to be submitted within 4 weeks following each meeting	
Project Implementation Review  (PIR)	Analyzes project performance over the reporting period. Describes constraints experienced in the progress towards results and the reasons. Draws lessons and makes clear recommendations for future orientation in addressing the key problems in the lack of progress.  The PIRs shall be documented with the evidence of the achievement of end-of-project targets (as appendices).	Senior Technical Advisors, with the Project Coordinators in PMUs	1 report to be prepared on an annual basis, to be submitted according to GEF requirements	

Semi-Annual Progress Report	<p>Part of Asian Development Bank requirements for project monitoring.</p> <ul style="list-style-type: none"> <li>- Narrative of the activities undertaken during the considered semester</li> <li>- Analyzes project implementation progress over the reporting period.</li> <li>- Describes constraints experienced in the progress towards results and the reasons.</li> </ul>	Execution: PMUs with Senior Technical Advisors	Semi-annual progress reports for any given year, submitted by January 31 (latest) for period 1 July ? 31 December of the previous year	
Quarterly expenditure reports	Detailed expenditure reports broken down per project component and budget line, with explanations and justification of any change	Execution: PMUs, in consultation with ADB Resident Missions and financial managers	Four (4) quarterly expenditure reports for any given year, submitted by January 31, April 30, July 31 and October 31 (latest)	

Medium-Term Evaluation (MTE)	<p>The purpose of the MTE is to provide an independent assessment of project performance at mid-term, to analyze whether the project is on track, what problems and challenges the project is encountering, and which corrective actions are required so that the project can achieve its intended outcomes by project completion in the most efficient and sustainable way.</p>	<p>PMUs and Senior Technical Advisors to facilitate, in cooperation with ADB Operational Department / Resident Mission</p> <p>Consultant specialists selected</p>	ADB/GEF Coordination team at 2 year of project implementation	\$35,000
Final Report	<p>Through multistakeholder workshop and consultation, the project team will draft and submit a Project Final Report, with other docs (such as the evidence to document the achievement of end-of-project targets).</p> <p>Comprehensive report summarizing all outputs, achievements, lessons learned, objectives met or not achieved structures and systems implemented, etc. lays out recommendations for any further steps to be taken to ensure the sustainability and replication of project outcomes.</p>	Execution: PMUs led by Senior Technical Advisors and project team cooperation	Final report to be submitted no later than three (3) months after the technical completion date	



Terminal Evaluation (TE)	Further review the topics covered in the mid-term evaluation.  Looks at the impacts and sustainability of the results, including the contribution to capacity development and the achievement of global environmental goals.	Independent evaluator(s) facilitated by ADB with cooperation from Executing Agencies	Start before project completion date	\$65,000
Total Budget				\$100,000

## 10. Benefits

**Describe the socioeconomic benefits to be delivered by the project at the national and local levels, as appropriate. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?**

These benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) and adaptation benefits (LDCF/SCCF) through the strengthening of ecosystem services in the project areas. This initiative will help take steps towards the improved ecological capacity of the ISLME.

The project (Timor-Leste and Indonesia) would result in 1,843 males and 1,784 female direct beneficiaries (**Core Indicator 11**). The breakdown is provided below.

### Indonesia

The direct beneficiaries for the Indonesian component of the project are expected to be providing farmers with better access to feed information and greater transparency up and down the shrimp and feed supply chains. Thus, the number of beneficiaries in the Indonesian component of the project is 1663 male farmers and 1664 female workers throughout the supply chains.

Within Indonesia, the desired outcome is to affect 25% of the Indonesian fisheries used for fishmeal in this project. Thus, 25% of 320,592 mt Indonesian wild fish used in fishmeal is 80,148 mt under improved management (**Core Indicator 8**: 80,148 mt wild fish move to more sustainable levels). *Contribute to true accounting for trash fish (and the costs).*

There is a potential socio-economic improvement in the coastal areas of Indonesia and the wider ISLME due to the reduction of this IUU fishing. This wild fish that is currently taken tends to be the bait fish of various

species of Billfish and Tunas. In some cases these fishes are also small pelagic fishes that are food security fishes that are an important source of protein and nutrition within the ISLME. The reduction on their capture will lead to improved productivity of fisheries which rely on 'trash fish' as their forage fish (high value species such as tuna) which are a treasured target of coastal fishers and therefore secondary beneficiaries of the project will be some of the six plus Million small scale fishers. That will provide additional benefits to local communities increasing their environmental sustainability and ability to adapt to climate change.

At the same time, the project is expected to considerably reduce 'trash fish' entering the shrimp feed supply chain as shrimp aquaculture grows in Indonesia

#### Financial and fiscal benefits:

In the long run, the project could also contribute to such benefits for governments in particular, such as reduced costs of environmental remediation of ocean ecosystems. Outcome 2.1 (Feed management system and sourcing guidelines), 2.1.2 Mass balance inspection protocol and 2.1.3 Shrimp feed tracking system in coordination with Output 2.1.4 Five supply chain validation exercises will identify alternatives to trash fish. These outputs will bring a much needed transparency around the use of these fisheries, while output 2.1.4 will support the development of traceability and accountability systems for trash fish and marine ingredients in shrimp feeds. Output 2.1.4 will also review a potential trash fish tax and licensing system which may contribute to new sources of tax revenue at both the national and provincial levels that could continue to incentivize these shifts beyond the life span of the project.

Other potential socio-economic benefits include the following:

- ? New job opportunities in supporting technological solutions for feed mills and feed-to-shrimp supply chains
- ? National Shrimp Plan (Outcome 1.1) and Marketing and Business plan (Outcome 1.2) will ensure strategic and sustainable growth of the whole Indonesian shrimp industry and more jobs for Indonesia
- ? New technologies and innovations that reduce the overall use of shrimp feeds and reduce losses from disease and poor husbandry, leading to increased profitability throughout the value chain
- ? New technologies and innovations in the whole shrimp supply chain
- ? Social enterprises to support the development of alternative protein sources to replace trash fish
- ? Knowledge management sharing across the Indonesian Shrimp sector and sharing of best practice in feed management and use

#### Timor-Leste

There are unlikely to be significant increases in productivity to increase incomes for seaweed farmers but the improved techniques will allow for the expansion of the seaweed beds into deeper waters. Seaweed farming is suitable for the landless and women and requires a small amount of finance for investment or operating costs. It is expected that 300 households will start or expand seaweed production, cultivating an additional 37.5 ha of seaweed beds, producing an additional 375 tonnes of RDS per year, worth \$750,000 at current farm-gate prices.

As regards ecosystem services, EAA planning will cover 200ha of improved marine habitat practices and deliver the annual mitigation of 75 mt of CO<sub>2</sub>-e, which over a 10 year accounting period would be an estimated 750 MT of CO<sub>2</sub>e.

## 11. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

### Overall Project/Program Risk Classification \*

PIF	CEO Endorsement/Approval	MTR	TE
Medium/Moderate	Medium/Moderate		

#### Measures to address identified risks and impacts

Elaborate on the types and risk classifications/ratings of any identified environmental and social risks and impacts (considering the GEF ESS Minimum Standards) and any measures undertaken as well as planned management measures to address these risks during implementation.

### Environment and Social Safeguards Screening

A comprehensive assessment for TL and INO has been conducted in coordination with the ADB loans in consideration in both countries. These reports are attached as Appendices to this report. Based on the review of both TL and INO the ESS Rating is **moderate risk** and details of this assessment are summarized below.

#### Indonesia

##### *Climate Risk Screening*

Indonesia consists of over 17,000 islands and has the third longest coastline in the world. Millions of Indonesians live in low-lying coastal locations just above sea level. Sea-level rise, globally, has been estimated by satellite observations to be approximately 3 mm per year since 1993.[1] Indonesia appears to have a higher-than-average sea-level rise according to satellite analysis which provides estimates of approximately 3.9 mm of sea-level rise per year.[2] Additionally, Indonesia ranks second only to China as the most earthquake-prone country in the world and it experienced a devastating tsunami in 2004 that claimed the lives of over 170,000 Indonesians. In 2018, a tsunami in Sulawesi resulted in nearly 4,000 deaths.

As Indonesia is situated in the Ring of Fire (the most seismically active region of the world), the earthquakes and potential for tsunamis will continue. The current increase in sea-level rise, human activity, and ground water depletion has also caused the subsidence of land in and around major cities in Indonesia, which are commonly located near the coastline. For example, the land under Indonesia's current capital is sinking at an average rate of 1-15 cm per year, with the rates of sinking unevenly distributed around the city's districts, from 1 cm per year in the south to up to 15 cm in the west and 25

cm in North Jakarta.[3] The seismic activity, increased rate of sea-level rise, and the land subsidence in cities near coastlines create a heightened level of vulnerability to climate change.

Shrimp farms are typically sited on the coastline or in estuarine ecosystems. Appropriate siting dictates an understanding of the hydrodynamics and water quality parameters such as salinity, dissolved oxygen, temperature, pH, organic matter, suspended solids, and any toxic substances that may persist in the environment. Additionally, the soil that shrimp farms are built on is a critical aspect to consider as many low-lying areas, where wetlands once existed can accumulate pyritic sulfur formations that when exposed to air and water create highly acidic conditions. These areas are to be avoided for the success of the farming endeavor. Multiple years of modeling and understanding of seasonal fluctuations in physical oceanography are key to the sustainability of shrimp farm operations. Unfortunately, many shrimp farmers have no choice as to where they may site facilities.

Most shrimp farmers have inherited their farming area from generations before them. In addition, the recognition of what makes an optimal shrimp farming site has come late in the development of the sector, thus larger farms are also in areas that may not be optimal for shrimp production. The key challenge is to maintain the water quality in and around the shrimp farm. This is because shrimp have a weak immune system and easily become infected by pathogenic organisms. In Ecuador in the late 1990s, almost all shrimp production was lost to the white spot syndrome virus (WSSV). Between 2013-2015, Thailand lost almost 50% of their shrimp production as a result of early mortality syndrome (EMS). These diseases? pathogenicity and virulence are increased when shrimp are stressed. Thus, climate change and the various factors that would affect key water quality aspects will introduce two important challenges to the project: (1) shrimp will likely be maintained in stressed conditions because most farmers are reliant on ambient conditions of weather to maintain shrimp productivity and when the weather changes, there are very few contingencies that farmers can put in place to address these changes. (2) What is understood today about the optimal conditions for bacteria and viruses that cause disease will not be enough to predict what viral and bacterial organisms will be enhanced with hotter temperatures, higher or lower salinities, different algal and zooplankton species, etc.

Shrimp farmers are often characterized by living on the edge of extreme wealth and extreme poverty because of how easily production systems can be decimated by disease. Create a changing environment where the pace of change increases and it is not clear when and where the next disease for shrimp will come from, and biosecurity becomes the best and greatest asset. Measures for biosecurity in the face of climate change will be critical to incorporate into all shrimp aquaculture projects. It will become essential to be much better at spotting disease trends and making the broader sector aware such that adequate epidemiological safeguards can be constructed rapidly.

The overall climate risk rating for the project is classed as Medium. The ?medium risk? rating is mainly because of knock on effects on the project from risks associated with:

(i) Temperature increase: Increase in annual and seasonal temperatures is projected throughout most of Indonesia.

Indonesia's mean annual temperature has already increased by ~ 0.8°C over the period 2010-2017 relative to a 1951-1980 baseline. Analysis of CMIP6 climate models indicates that most of Indonesia is projected to experience temperature increases of ~1.5°C by mid-century relative to 1995-2014 (SSP5/RCP8.5). Increased temperatures are likely to cause poor growth and survival of some shrimp/fish species, water quality deterioration, thermal stratification, and increased virulence of warmer water pathogens.

(ii) Precipitation increase: Projected changes in precipitation are not uniform over Indonesia, and some areas may experience decreased precipitation. However, multiple model-based studies indicate that annual precipitation is projected to increase throughout most of Indonesia. Most projected increases occur during the wet season, while dry season precipitation may decrease (e.g., CORDEX-SEA). Increased seasonal precipitation (and runoff) will increase erosion and siltation of watercourses, flooding, and precipitation induced landslide events.

(iii) Flooding: Flooding is more closely associated with increases in short-duration (i.e., daily or sub-daily), high-intensity precipitation than with overall seasonal precipitation accumulation. Annual maximum 1-day precipitation (Rx1day) is projected to increase throughout the Indonesia region, with an increase ranging between 0% and 20%, particularly in Kalimantan, Sulawesi and northern Sumatera. Most (but not all) of these changes lie outside the range of historical variability. Increased frequency and/or magnitude of short-duration, high intensity precipitation is associated with enhanced risks from pluvial flooding, and from wet landslides, which are a common hazard in Indonesia. An increase in high-intensity precipitation will also result in higher rates of soil erosion and sedimentation of river channels and reservoirs, unless addressed by effective soil conservation measures. The impacts of flooding on aquaculture in Indonesia include changes to salinity in estuaries and coastal locations; loss of stock when ponds overflow or dykes collapse; increased sediment/pollution; and damage to (or destruction of) production facilities.

(iv) Precipitation decrease: Projected changes in precipitation are not uniform over Indonesia, and while most locations within Indonesia are projected to experience increased precipitation some areas may experience decreased precipitation. Also, even locations projected to experience an overall increasing precipitation trend will still experience drought periods due to the high degree of interannual to decadal variability associated with Indonesia's hydroclimate. While adaptation strategies need to be developed to manage increases in precipitation and floods, it is also important to ensure strategies are in place to manage and mitigate the impacts of droughts when they inevitably occur. Drought reduces freshwater supply to aquaculture locations and also negatively impacts rice/corn yields (i.e., feed supply and increasing production costs).

(v) Sea level rise: Indonesia is highly exposed to risks associated with sea level rise due to its island geography and large coastal cities with over 80,000 kilometers of coastline and 42 million people living less than 10 meters above sea level.<sup>1</sup> It is estimated that by the 2030s approximately 5.5 million to 8 million people could reside in a 100-year floodplain (an area exposed to 1-in-100-year coastal floods resulting from storm surges), growing to 9.5 million to 14 million people by the 2060s. These estimates assume a modest sea-level rise of 10 centimeters (cm) by 2030 and 21 cm by 2060. Sea level rise is not just a threat due to long-term encroachment on coastal areas, but also due to the projected increase in the frequency of extreme sea-level events. The return period of exceptionally high sea levels is expected to reduce, and low-lying Indonesian islands are particularly at risk. Wave heights which historically occurred only once every ten years could occur every 4 to 10 years by 2070-2100, even under lower emissions scenarios (SSP2/RCP4.5). Aquaculture, with most of the production centers located in low land, is highly vulnerable to sea level rise.

The main purpose of the project is not climate adaptation, the main purpose is to increase environmental sustainability of shrimp aquaculture feed supply in Indonesia. The project is fully aligned with Indonesia's updated Nationally Determined Contributions (NDC) as well as with the three key objectives associated with the Food and Agriculture Organization's (FAO's) definition of climate smart fisheries and aquaculture: (i) achieving sustainability of the business supply chains, (ii) ensuring shrimp resources, shrimp farmers and entrepreneurs, and shrimp aquaculture supply chains are resilient to the current and projected impacts of climate change, and (iii) where possible, reduce GHG emissions associated with business supply chains. The proposed project interventions are holistic and integrative, in line with the principles of climate-smart agriculture/aquaculture, and address key challenges of the stakeholders (e.g. farmers, communities, MMAF), the ecosystems (e.g. mangroves, water), built infrastructure (e.g. irrigation, canals, drains, ponds, electricity, roads, broodstock centers, lab facilities), and in the shrimp aquaculture supply chains from production, processing, logistics and distribution and access to markets.

### *Indigenous Peoples Screening*

The initial screening generated from geospatial analysis of the proposed sites shows no overlaps with Outcome 2 with Indigenous peoples, however, Outcome 1.1 will have an indirect impact on Indigenous peoples across the country. Further IP screening will be conducted at the four feed supply chains to confirm the potential impact on IP safeguard issues. The IPPF and IPP will comply with both government regulations and ADB social safeguard policy statements (2009).

## Environment and Social Safeguards

For the Shrimp Industry support, there is only minimal engagement at the field level for outcomes 1.1, 2.1 and 4.1 therefore according to the ADB SPS 2009, the project may fall under **Category C** as it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required.

Table 7: Summary of Potential Environmental and Social concerns, Level of Risk and Potential Mitigations (INO)

### Timor-Leste

#### Climate Risk Screening

Most seaweed production takes place on the island of Atauro which lies 30km to the north of the city of Dili. The region is quite small; only about 20km on its long axis and about 7.5km on its short axis, with a total area of 150km<sup>2</sup>. Within this area, the terrain includes most coastal areas and lower slopes with a small patch of upland area at about 800m elevation in the center. Rivers are generally short and steep and during periods following heavy rain can cause flooding in coastal streams.

i) **Rainfall variance:** The annual average rainfall for Atauro is 960mm and the time series data for rainfall plotted in Figure 19 shows that there is a very slight increasing trend of about 22mm per decade. More importantly, the plots show that rainfall varies considerably from year to year, ranging from about 620mm to 1,390mm.

Figure 42 Annual rainfall timeseries, Atauro climate zone (1981-2021).

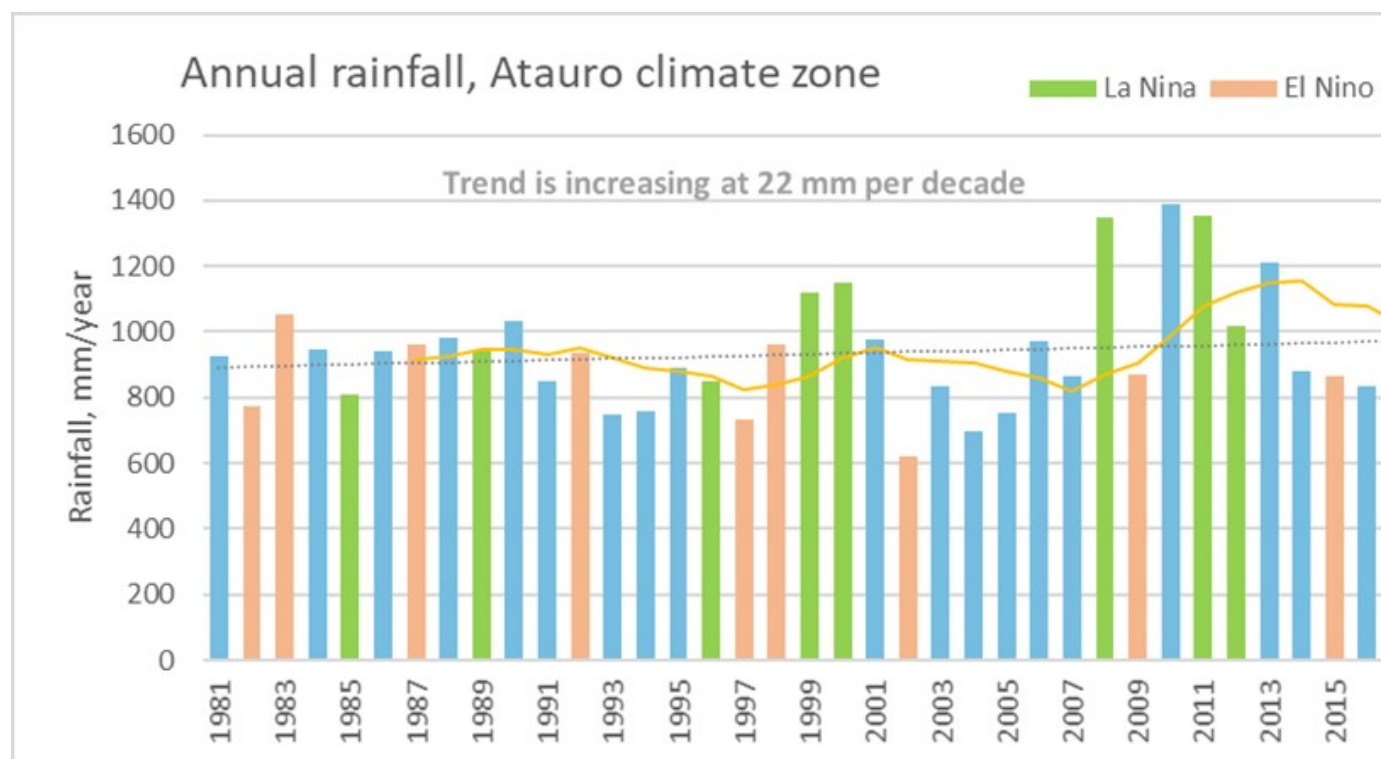


Figure 19: Annual average rainfall of Atauro from 1981 to 2021

There is significant inter-annual variability in rainfall, with the El Niño Southern Oscillation (ENSO) exerting a strong influence over rainfall variability. El Niño conditions bring drier conditions and shorter, delayed wet seasons, often causing droughts, whilst La Niña conditions cause higher rainfall even in the dry season and are linked to higher tropical cyclone activity. For the period 1950-1999 Dili recorded its two record low rainfall totals during the El Niño events of 1982-83 and 1997-98.

ii) **Temperature increases:** Timor-Leste has a hot and humid tropical climate influenced by the Western Pacific monsoon and the mountainous relief of the island. Average annual temperatures vary little throughout the year, but altitude exerts a strong influence, with annual temperatures averaging 27°C on the coast.[1],[2]

Estimates of the rate of temperature change vary from 0.16°C/decade since 1950[3] to a more modest 0.11°C/decade from 1979-2005[4]. **Figure 20** displays the trend in temperature since 1980 around Dili, in the North, based on reanalysis data to provide continuity. The increase since around 2000, in particular, has been pronounced. Minimum, Maximum and Average temperatures will all increase under all scenarios. **16** For RCP4.5 average annual temperatures are likely to increase around 1°C for the 2036-2065 period, and 1.1-1.6°C for the 2066-2095 period, while for RCP8.5 increases are larger, with 1.2°C-1.6°C expected for 2036-2065, and 2.2-3.0°C for 2066-2095, all relative to 1986-2005.

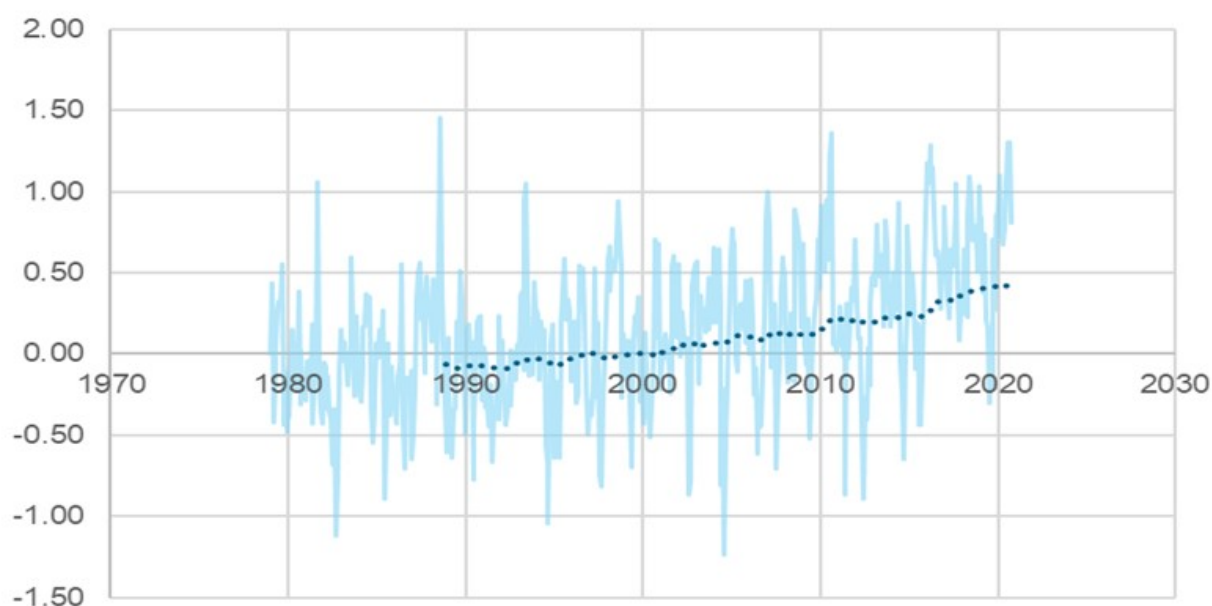


Figure 20: Monthly anomalies with respect to long term average temperature based on ERA5 reanalysis data (decadal moving average trend) Source: KNMI Data Explorer

Table 8: An overview of temperature change (°C) projected Timor-Leste over different time horizons, emissions pathways, and measures of temperature, showing the median estimates of the full CCKP model ensemble and the 25th, 50th and 75th percentiles. Source: The World Bank Group Climate Change Knowledge Portal (CCKP). Climate Data: Projections. 2019. <https://climateknowledgeportal.worldbank.org/country/timor-leste/climate-data-projections>.

Summary of Potential Environmental and Social concerns	Level of Risk	Potential Mitigations
Growth in GHG emissions associated with increasing business supply chains of shrimp	Medium	The National Shrimp Plan will include a section on reducing GHG emissions throughout the entire global supply chain
Loss of livelihoods of trash fish fishers and fishing boats (potentially an IUU fishery)	Medium	There is little current information on the status of the trash fish fishery in Indonesia as more information comes to light the project team can adjust and adapt a mitigation section into the trash fish policy review
Potentially harmful alternative sources of protein to replace trash fish	Low	When considering alternative sources of protein into the shrimp feed (Outcome 2.1.4 supply chain pilot), environmental and social safeguards should form a core criteria alongside price

Scenario		Annual average of monthly maximum		Annual average		Annual average of monthly minimum	
		2036-2065	2066-2095	2036-2065	2066-2095	2036-2065	2066-2095
<b>RCP4.5</b>	25 <sup>th</sup>	0.86	1.18	0.79	1.09	0.72	1.00
	50 <sup>th</sup>	0.95	1.29	0.92	1.26	0.96	1.23
	75 <sup>th</sup>	1.14	1.58	1.19	1.58	1.10	1.54
<b>RCP8.5</b>	25 <sup>th</sup>	1.19	2.26	1.24	2.25	1.23	2.24
	50 <sup>th</sup>	1.33	2.60	1.30	2.47	1.33	2.46



	75th	1.59	3.00	1.56	2.93	1.55	2.94
--	------	------	------	------	------	------	------

**Sea-level rise:** To mid-century, mean sea level rise follows a similar trajectory regardless of whether RCP4.5 or RCP8.5 is used, with a mean increase of 25cm, and increases of 37cm at the top of the range of projections. Beyond that there is significant divergence; the mean value for the higher emissions RCP8.5 shows an increase of 80cm by 2100, while the mean value for RCP4.5 is 58cm. Even under the lower emissions scenario, increases of just over 80cm are possible, while in the high emissions scenario sea level rise could exceed 1m. Recent research and modelling of sea level rise has tended to increase the amount of sea level rise expected, as a result of improved understanding of ice sheet dynamics[5], so from a risk assessment perspective, it may be prudent to assume higher values.

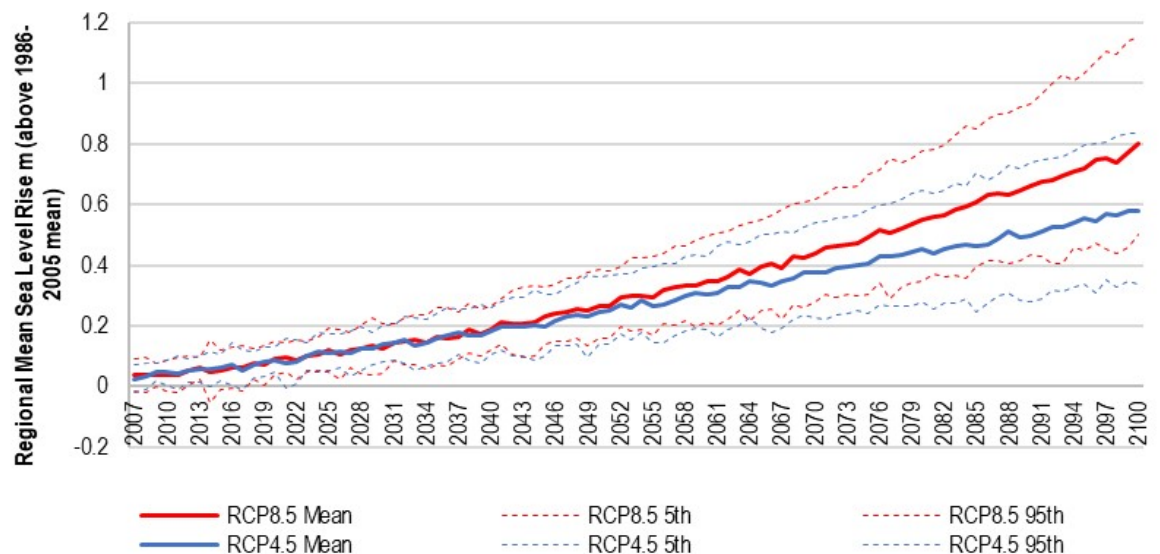


Figure 21: Mean Sea Level Rise to 2100 for Timor-Leste

**Wind driven waves** The wind-wave climate of Timor-Leste is strongly characterised by the West Pacific Monsoon winds in December to March and south-easterly trade winds in June to September. Wind-waves around Timor-Leste are quite small, typically less than one metre high. At Dili on the north coast, slightly larger than average waves are directed from the east-northeast during June to September

**Ocean acidification.** About one quarter of the carbon dioxide emitted from human activities each year is absorbed by the oceans. As the extra carbon dioxide reacts with seawater it causes the ocean to become slightly more acidic. This impacts the growth of corals and organisms that construct their skeletons from carbonate minerals. These species are critical to the balance of tropical reef ecosystems. Data show that since the 18th century the level of ocean acidification has been slowly increasing in Timor-Leste's waters.

**Natural hazards.** According to the World Risk Report, which generates rankings based on exposure and vulnerability to Natural Hazards, Timor-Leste ranks 20<sup>th</sup> globally (24<sup>th</sup> in exposure, 51<sup>st</sup> in vulnerability (of which 43<sup>rd</sup>, 42<sup>nd</sup> and 82<sup>nd</sup> in susceptibility, lack adaptive capacity and lack coping capacity)[6]. Floods, droughts, landslides and cyclones are the major natural hazards. Flooding is the most frequent disaster, with riverine and flash flooding occurring during periods of extreme rainfall; significant flood events were recorded in 2001, 2003, 2006, 2013, 2019 and 2020[7]. Flood risk is expected to increase in the future as extreme rainfall events become more common, and the increasing population means that more people live in flood-prone areas. Cyclones also lead to flooding; however, these are more common in the east of the island and usually have a low impact whilst passing Timor-Leste. Nonetheless, cyclones are likely to increase in frequency due to climate change.

The result of the initial climate risk screening included in The Rapid Environmental Assessment is **medium** due to seaweed production being susceptible to weather-based events such as storms. Mitigation measures include introducing production techniques that are less affected by flood risks and wave action.

#### *Environment and Social Safeguards*

The Rapid Environmental Assessment identified that seaweed cultivation would take place in legally protected areas, specifically Marine Protected Areas already established in Atauro and a planned one in Metinaro. Both areas are also home to mangrove forests. However, the project will be implemented using the EAA methodology, preventing any negative environmental impacts. Socially, seaweed cultivation can involve community safety risks due to drowning and crocodile attacks.

According to the ADB SPS 2009, the project may fall under **Category C** as it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications will need to be reviewed.

#### *Other safeguards*

Involuntary resettlement policy - no resettlement is planned as part of this project.

Indigenous peoples policy - Timor-Leste does not recognise the term 'indigenous' to describe its people.

Pest management policy - The planned project does not include pest management practices.

Physical cultural resources policy - Significant impacts to physical cultural resources are not envisaged on the project.

Stakeholder engagement - Inclusive and participatory stakeholder engagement will be critical for the success of the project.

Gender mainstreaming - Gender empowerment will be integrated throughout the project.

#### Project contribution to COVID-19 pandemic recovery: **Build back blue?**

The fragility of the global food system has been tested during the Covid 19 pandemic. The food system and respective supply chains operate on the razor's edge of food system function and food system collapse. Without contingency plans for widespread logistical disruptions, shortages in human labour, disease spread amongst workers and labourers, and more economic safety nets for the most vulnerable, the same challenges will resurface during the next pandemic which is inevitable.

Supply chain disruption and logistical backlogs are a result of a food system that has no contingency plan(s). Furthermore, much of the supply chain structure is based on relationships, traditions, inequalities of power, side deals, fraud, substitution, quality disincentives, traceability and transparency disincentives, and margins that cannot even sustain a livelihood.

The opportunity to **build back blue**? in the Indonesian shrimp sector and the Timor-Leste seaweed sector present great opportunities to take stock of what has transpired in the pandemic and what could have or should have been done to safeguard supply chains and the people that work in them. Key aspects of building back blue in supply chains and specifically the Indonesian shrimp and Timor-Leste aquaculture sectors are:

- a. Equity in value chains for wealth sharing that affords a living wage that can cushion workers in times of pandemics
- b. Product origin laws for farm species and feed ingredients which support rapid response to diseases of humans and animals
- c. Widespread understanding of the fundamental ways that viruses and bacteria infect and cause disease in humans and livestock
- d. Separation of livestock from humans and segregation of one species of livestock from another
- e. Migrating off the dependency of unapproved drugs and chemicals for undiagnosed animal ailments
- f. Importation testing and clear coupled with 'trace backs' to ensure imported goods can be effectively traced back to its origin
- g. Linking climate change and new disease threats and better predictive analytics to spot trends and share information rapidly across countries
- h. Creating national strategies and early warning systems that can integrate with other neighbouring countries to be provided adequate advance notice of animal or human diseases
- i. Creating space for nature to recover and provide a buffer zone for the zoonotic spread of novel pathogens
- j. Increasing incomes more broadly to reduce bushmeat consumption and trade
- k. Elimination of non-domesticated pets from the wild
- l. Reducing human-wildlife conflict through ecological corridors and the recognition that nature is an asset that must be preserved for human protection.

As the food system is so fragile, COVID-19 has alerted us to the needs to protect this system and life on Earth. We need to heed these warnings and incorporate them into all development projects for the sustainability of life and project outcomes.

- 
- [1] United States Agency for International Development. *Timor-Leste Climate Risk Profile*. 2017.
  - [2] Government of Timor-Leste. *Timor-Leste Disaster Management Reference Handbook*. 2019
  - [3] USAID (2017) Timor-Leste Climate Risk Profile
  - [4] Timor-Leste National Adaptation Programme of Action (NAPA)
  - [5] See IPCC. 2019. Special Report on the Ocean and Cryosphere in a Changing Climate; Garner *et al.* 2018. *Evolution of 21st Century Sea Level Rise projections*. *Earth's Future* 6(11): 1603-1615.
  - [6] <https://weltrisikobericht.de/english/>
  - [7] Timor-Leste Disaster Risk Management Handbook. 2019.

- 
- [1] Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K., ... & Miller, H. (2007). IPCC fourth assessment report (AR4). Climate change, 374. [https://www.ipcc.ch/site/assets/uploads/2018/03/ar4\\_wg3\\_full\\_report-1.pdf](https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg3_full_report-1.pdf)
  - [2] Triana, K. (2020). Sea Level Rise in Indonesia: The Drivers and the Combined Impacts from Land Subsidence. *ASEAN Journal on Science and Technology for Development*, 37(3), 115-121. <https://ajstd.org/index.php/ajstd/article/view/627/525>
  - [3] Abidin, H. Z., Andreas, H., Gumilar, I., Fukuda, Y., Pohan, Y. E., & Deguchi, T. (2011). Land subsidence of Jakarta (Indonesia) and its relation with urban development. *Natural hazards*, 59(3), 1753-

1771.[https://www.researchgate.net/publication/237757739\\_Land\\_Subsidence\\_and\\_Urban\\_Development\\_in\\_Jakarta\\_Indonesia](https://www.researchgate.net/publication/237757739_Land_Subsidence_and_Urban_Development_in_Jakarta_Indonesia)

#### Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
<b>TIMOR-LESTE Rapid Environmental Assessment (Safeguards)</b>	<b>CEO Endorsement ESS</b>	
<b>TIMOR-LESTE Climate Resilience and Adaptation Assessment</b>	<b>CEO Endorsement ESS</b>	
<b>REA TIM WHAIP</b>	<b>CEO Endorsement ESS</b>	
<b>INDONESIA Shrimp Safeguards Due Diligence</b>	<b>CEO Endorsement ESS</b>	
<b>INDONESIA Shrimp Poverty Gender Equality Social Impact Assessment</b>	<b>CEO Endorsement ESS</b>	
<b>INDONESIA Shrimp Indigenous Peoples Planning Framework</b>	<b>CEO Endorsement ESS</b>	
<b>INDONESIA Shrimp Environmental Assessment and Review Framework</b>	<b>CEO Endorsement ESS</b>	
<b>21-09-09 INDONESIA IR Categorization Form</b>	<b>Project PIF ESS</b>	
<b>21-09-09 INDONESIA Environmental Screening and Categorization</b>	<b>Project PIF ESS</b>	
<b>21-09-07 Timor-Leste Rapid Environmental Assessment (ADB)</b>	<b>Project PIF ESS</b>	
<b>21-09-13 Indonesia Country Climate Risk Profile</b>	<b>Project PIF ESS</b>	

Title	Module	Submitted
21-09-13 Timor-Leste Country Climate Risk Profile	Project PIF ESS	

**ANNEX A: PROJECT RESULTS FRAMEWORK** (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

<b>Design Summary</b>	<b>Performance Targets and Indicators with Baselines</b>	<b>Data Sources and Reporting Mechanisms</b>	<b>Assumptions and Risks</b>
-----------------------	--	--	------------------------------

<p><b>Impact</b></p> <p>To alter the trajectory towards more sustainable and conversion-free aquaculture production within the Indonesia Seas Large Marine Ecosystem (ISLME)</p>	<p>One farm meets national or international third-party certification incorporating biodiversity and shrimp feed considerations. (Indonesia)</p> <p>80,148 tonnes wild fish move to more sustainable levels (Indonesia)</p> <p>Beneficiaries (by 2028)</p> <p>1,843 males and 1784 females</p> <p>of which:</p> <p>1663 males (Indonesia): 1664 females (Indonesia)</p> <p>180 males (Timor-Leste): 120 females (Timor-Leste)</p> <p>An increase of 200ha of improved marine habitat practices by 2033 (Timor Leste)</p> <p>75 MT of CO2 mitigated (Timor Leste per annum) (total 750MT) by 2037 (with accounting starting in 2027)</p>	<p>Aquaculture Standards Certification shrimp fishery certified (Shrimp and compliant with shrimp feed policy)</p> <p>Project documentation on ?trash fish? initiative</p> <p>Mass balance protocol and traceability system in place to track status and reduction of trash fish</p> <p>EAA reports by local authorities</p> <p>Blue Horizon methodology estimates (WWF project)</p> <p>Project reporting (including post-project reviews)</p>	<p>Assumptions: Market is willing to price in the costs of reducing risks within their supply chain</p> <p>Assumptions: Feed mills able to find alternative sources to trash fish</p> <p>Assumptions: MMAF internalizes trash fish policy that adopts tracking in government and industry statistics</p> <p>Risks: Unclear whether Feed mills willing to share ?proprietary information? and be more transparent on the ingredients used in producing shrimp feed</p> <p>Risks: Trash fish not currently defined in Government</p>
--	---	--	--

		Mid-Term Review and Terminal Evaluation	statistics and related policies
--	--	--	------------------------------------



<p><b>Outcome 1.1</b></p> <p>Development and implementation of national strategies for priority commodities</p> <p>(Indonesia and Timor-Leste)</p>	<p>Environmental sustainability and ecosystems services targets stated in the seaweed strategy are met as planned by 2030 (Timor-Leste)</p> <p>A comprehensive shrimp aquaculture plan is in place by 2025 and covers social, environmental and governance issues (Indonesia)</p>	<p>Project reporting (including PIRs)</p> <p>Project Coordination Committee meetings</p> <p>Mid term and Terminal Evaluation</p>	<p>Assumptions:</p> <p>Environmentally destructive aquaculture production does not significantly increase</p>
<b>Outputs</b>			
<p>1.1.1 National Action Plans for Shrimp Aquaculture adopting Aquaculture Management Area (AMA) approach including climate change mitigations and resiliency prepared through multi-stakeholder consultations - to increase the environmental sustainability of the shrimp aquaculture sector executed</p> <p>(Indonesia)</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>-</p>	<p>National Action Plan developed through multi-stakeholder processes by 2024 with resulting activities as input for 2025-2029 RJMNP (Mid Term Development plan of BAPPENAS), which include gender analyses and targets.</p> <p>Assessment of shrimp aquaculture value chains are included in the Action Plan</p>	<p>National Plan published, disseminated (including posting on MMAF website)</p> <p>Gender targets internalized in the National Action Plan</p>	<p>Assumptions:</p> <p>Sea level rise and climate changes impacts have no large-scale negative impact on the shrimp industry</p> <p>Risks: Poor biosecurity management introduces new diseases / perpetuates old ones, which have detrimental impact on the industry</p>

<p>1.1.2 Marketing and business plan for renovated shrimp sector for greater magnitude of market reach developed (Indonesia)</p>	<p>Marketing and business plan complete by 2024, implemented by 2027. Shrimp Feed Action Plan, part of the National Shrimp Aquaculture Action Plan, includes gender dimensions (and targets if possible)</p>	<p>Business plan disseminated through multimedia approach</p> <p>Media reports</p> <p>Project reporting (including PIRs)</p>	<p>Assumptions: A comprehensive analysis is conducted through engagement with all sectors of the industry throughout the value chain</p> <p>Risks: Consultation processes or engagement across stakeholders is incomplete or weak</p>

<p>1.2.1 National Seaweed Aquaculture Strategy prepared through multi-stakeholder consultations - aligned with National Aquaculture Development Strategy to increase the environmental sustainability and ecosystem services of the seaweed sector</p> <p>(Timor-Leste)</p>	<p>National Seaweed Aquaculture Strategy completed and adopted by MAF by 2024</p>	<p>NFDA publication</p> <p>Project reporting (including PIRs)</p> <p>Media reports</p>	<p>Assumptions: Government remains committed to increasing seaweed production</p> <p>Risks: Financing is not available to effectively implement the strategy</p>
<p><b>Outcome 2.1</b></p> <p>A credible and functioning feed management system created to connect shrimp feeds to shrimp products to satisfy the growing international market demand.</p> <p>(Indonesia)</p>	<p>Feed management system with sourcing guidelines, protocol and traceability system designed, validated, and in use by at least two feed mill companies by 2025 with the Feed Mill association of Indonesia committed to promoting/scale up adoption to 25% of members by 2028</p> <p><u>Gender indicator</u></p> <p>- At least 30% of trainees are women</p>	<p>Feed sourcing policy and guidelines presented and adopted by Feed Mills Association of Indonesia</p> <p>Project reporting including PIRs</p> <p>Media reports</p> <p>Mid term and Terminal Evaluations</p>	<p>Assumptions: Feed mill association is actively engaged, and understands potential benefits</p> <p>Risks: Feed Mills may not be willing to share proprietary information and/or collaborate with competitors</p>
<p><b>Outputs</b></p>			

2.1.1 Two convenings of Indonesian government, feed and processing sectors to be trained on requirements to access markets of the Seafood Task Force (STF) (Indonesia)	<p>Two trainings for multiple stakeholders along the shrimp value chain conducted for on the requirements to access markets of the STF companies, conducted by 2025</p> <p><u>Gender indicator</u></p> <p>Training design is gender sensitive</p> <p>At least 30% of trainees are women</p>	<p>STF publications and reports</p> <p>Media reports</p> <p>Project reporting including PIRs</p> <p>Project Coordination Committee proceedings</p> <p>Mid Term and Terminal Evaluation</p>	<p>Assumption: Seafood Task Force Companies interested to engage</p> <p>Risk: Limited uptake of training by private sector companies and other stakeholders due to lack of interest or understanding of the market opportunity</p>
2.1.2. Mass balance inspection protocol to validate feed to shrimp tracking generated (Indonesia)	Third party mass balance inspection protocol developed and functioning and tracking feeds to at least two feed mills by 2025	Project reporting including PIRs	<p>Assumption: A applicable technological solution found to capture traceability</p> <p>Risk: No Feed mill volunteers for adoption of the mass balance protocol</p>
2.1.3: Shrimp feed to shrimp tracking system developed. System requirements for feed to shrimp tracking co-created by Government and Industry and supported by roadmap and execution timeline. (Indonesia)	Shrimp IT system designed, tested, validated and operational by 2027.	<p>IT system documentation prepared with manual of operations.</p> <p>Project reports including PIRs</p> <p>Media reports</p> <p>Mid Term and Final Evaluation</p>	<p>Assumption: Parameters for the system are relevant and of interest to the feed mills.</p> <p>Risk: The business sector unwilling to adopt the system, due to</p>

			disclosure requirements
--	--	--	----------------------------

<p>2.1.4: Five supply chain validation exercises to refine and improve feed to shrimp tracking system supported (Indonesia)</p>	<p>Five supply chain validation exercises conducted leading to improvement in feed to shrimp tracking system</p> <p>Supply chain validation exercises should consider gender roles in feed to shrimp tracking, and include targets where possible</p> <p>a) Policy and regulatory improvements and shrimp feed action plan disseminated by 2027</p> <p>b) Traceability and accountability of ?trash fish? and marine ingredients in shrimp feeds developed and shared with the industry by 2027</p> <p>c) Innovative, cost effective, and functional shrimp feeds prototypes developed for potential commercialization by 2027</p> <p>d) Sustainable financing for feed to shrimp connectivity supported by the proposed framework by 2027</p> <p>e) Digital technology and other applications for feed to shrimp connectivity and related knowledge products disseminated by 2028</p>	<p>Media reports</p> <p>Dissemination of specific sub-outputs through knowledge management strategy</p> <p>Project reporting including PIRs</p> <p>Project Coordination Committee proceedings</p> <p>Mid term and Terminal Evaluations</p>	<p>Assumptions: Sufficient data and capacity is available to conduct these activities</p> <p>Risks: Reluctance of industry and trash fish suppliers to disclose information and participate in exercises including trash fish review</p> <p>High cost of alternative sources of protein as opposed to trash fish</p>
---	--	--	--

<p><b>Outcome 3.1:</b> Seaweed aquaculture and capture of nutrients from the ocean expanded</p> <p>(Timor-Leste)</p>	<p>An additional 37.5 ha of seaweed cultivated directly due to project support by 2028</p>	<p>Project reporting including PIRs</p> <p>Project Coordination Committee proceedings</p> <p>Mid term and Terminal Evaluations</p>	<p>Assumptions: Environmentally destructive aquaculture production does not significantly increase.</p> <p>Risks: Seaweed cultivation hampered by climate and other risk factors</p>
<p><b>Outputs</b></p>			
<p>3.1.1. <i>Blue carbon credit payment agreements facilitated for seaweed ecosystem services.</i></p>	<p>Manual on how to quantify ecosystem services using Blue Horizon methodology completed and shared through training by the end of 2027</p>	<p>Guidance manual published and disseminated</p> <p>Project reporting including PIRs</p> <p>Project Coordination Committee proceedings</p> <p>Mid Term and Terminal Evaluation</p>	<p>Assumptions: The production volume of seaweed in Timor Leste justifies quantifying &amp; compensating for ecosystem services to attract carbon credit trade.</p> <p>Risks: Ecosystem compensation payments are not significant enough or do not reach seaweed farmers to encourage expansion in seaweed production</p>

<p>3.1.2: Workshops conducted to develop/implement 1.2.1 and 3.1.1, including representation across key ministries and involvement of relevant private sector players.</p>	<p>Three workshops conducted to develop seaweed strategy by 2024. One workshop to assess the implementation of seaweed strategy by the end of 2026 Three workshops conducted to facilitate new approaches to quantifying and compensating for ecosystem services by the end of 2027</p> <p><u>Gender indicators:</u> Workshops under 3.1.2 should include at least 40% women</p> <p>Management planning and demonstration activities in Atauro and Metinaro should include at least 50% women in the consultations and encourage/support women-based enterprises in the seaweed sector</p> <p>Encourage at least 50% women's participation in the demonstration of production and post-harvest handling in seaweed aquaculture sites</p>	<p>Workshop proceedings</p> <p>Associated knowledge products</p> <p>Project reports including PIRs</p> <p>Project Coordination Committee proceedings</p> <p>Mid term and Terminal Evaluations</p>	<p>Assumptions: Seaweed is seen as a viable business proposition in project areas</p> <p>Risks: Financial and technical impediments persist to expansion of seaweed sector</p>
--	--	---	--



3.1.3: Policy and regulatory gap framework analysis from GEF 7 Blue Horizon project adopted and applied to Timor-Leste to generate policy recommendations including zoning, mooring, prevention of marine mammal entanglements, and carrying capacity	<p>Manual on policy &amp; regulatory gap framework analysis methodology completed by 2024</p> <p>Recommendations for seaweed policy and strategy completed by mid-2024 (to inform seaweed strategy by the end of 2024)</p>	<p>Manual produced and disseminated</p> <p>Project reporting including PIRs</p> <p>Project Coordination Committee proceedings</p> <p>Mid term and Terminal Evaluations</p>	Assumptions: Policies and regulations are implemented and enforced
<p><b>Outcome 3.2:</b> Seaweed farmers increase production and adopt sustainable seaweed production techniques</p> <p>(Timor-Leste)</p>	<p>The seaweed cultivation area increased from 70 ha in 2022 to 107.5 ha by 2028</p> <p>Six cultivation areas implement sustainability management plans</p>	<p>Media reports and knowledge products</p> <p>Project reporting including PIRs</p> <p>Project Coordination Committee proceedings</p>	Assumptions: Environmentally destructive aquaculture production does not significantly increase
<b>Outputs</b>			
3.2.1: Sustainable marine resource management and planning demonstrated in Atauro and Metinaro.(Timor-Leste)	Ecosystems Approach to Aquaculture (EAA) is completed in seaweed growing areas of Metinaro and Atauro by the end of 2026	<p>EAA reports</p> <p>Project reporting including PIRs</p>	Assumptions: Local authorities enforce sustainable management plans
3.2.2 Improved production and post-harvest handling techniques demonstrated in Atauro and Metinaro	300 farmers trained in improved production and post-harvest handling techniques (50 % women) by 2028	<p>Project reporting including PIRs</p> <p>Mid Term and Terminal Evaluations</p>	Assumptions: Farmers have access to finance and labour for seaweed farming

<p><b>Outcome 4.1:</b></p> <p>Timor-Leste Seaweed farmer groups engage with more diverse markets</p>	<p>Increase in seaweed exports by 375 tonnes due to direct project support by 2028</p>	<p>Export statistics</p> <p>Project reporting including PIRs</p>	<p>Assumptions:</p> <p>Seaweed cultivation is viewed as viable business opportunity with increased interest in expansion to higher valued added activities</p>
<p><b>Outputs</b></p>			
<p>4.1.1: Seaweed farmer groups strengthened to aggregate and store raw dried seaweeds (RDS) Timor-Leste</p>	<p>12 additional seaweed groups aggregating seaweed due to direct project support by 2028</p> <p><u>Gender indicator:</u></p> <p>Inclusive approaches are followed to ensure the participation of at least 40% women in the strengthening of the capacity of seaweed farmer groups</p>	<p>Project reporting including PIRs</p>	<p>Assumptions:</p> <p>Exporters continue to trade seaweed sourced in Timor- Leste</p> <p>Risks: Market and other factors make Timor-Leste seaweed less attractive commodity</p>
<p>4.1.2: Traders and seaweed farmer group leaders trained in contract brokerage and export procedures Timor-Leste</p>	<p>Twenty seaweed exporters trained by the end of 2026</p> <p><u>Gender indicator:</u></p> <p>At least 3 women-led enterprises supported to engage with international buyers</p>	<p>Export data</p> <p>Project reporting including PIRs</p>	<p>Assumptions:</p> <p>Importing countries keen to source seaweed from Timor-Leste</p>

4.1.3: Seaweed traders and farmer group leaders network with international buyers (Timor-Leste)	Two off-take agreements facilitated an in place by 2028	Project reporting including PIRs	Assumptions: International trade in seaweed remains financially viable
4.1.4: Expanded collaboration through 3 workshops with GEF 7 Blue Horizon seaweed aquaculture project participants result in 2 product off-take agreements (Timor-Leste)	Three workshops with GEF 7 Blue Horizon seaweed aquaculture project participants by 2028	Project reporting including PIRs	Assumptions: There is interest in exporting seaweed from Timor-Leste to Viet Nam and Philippines (Blue Horizon countries)
<b>Outcome 4.2:</b> Engagement of Indonesian shrimp industry leadership/ association with the STF			
<b>Outputs</b>			
4.2.1: Pre- and post-project inspection by the Seafood Task Force (STF) to understand STF requirements and confirm requirements have been met (Indonesia)	Pre (2023) and post (2025) project inspection evaluation conducted by STF	Pre and post project reports  Knowledge products  Project reporting including PIRs  Project Coordination Committee proceedings	Assumptions: Seafood Task Force and members interested in engaging.  Risks: STF requirements are not clearly communicated or understood by local industry

4.2.2: Feed/shrimp tracking program action plan communicated / socialized and implemented at project sites (Indonesia)	At least two feed mills fully integrate feed tracking program across the whole value chain by 2025 in two focal geographies (Java / Sumatra) Feed/shrimp tracking program action plan communicated equally to men and women as target audiences	Two case studies of the tracking system documented  Project reporting including PIRs.  Project Coordination Committee proceedings	Assumptions: Seafood Task Force and early adopter members are willing advocates to share their experience  Risks: Industry reluctant to engage with STF due to limited understanding of benefits
4.2.3: Supply chain renovations of shrimp traceability, broodstock and hatchery facilities, controlled intensification of farms and product quality and safety controls demonstrated in 5 buyer visits to renovated sites will inform business and marketing plans for greater market access (see 1.1.2) (Indonesia)	Five buyer visits conducted	Five buyer visits documented  Media reports and knowledge products  Project reporting including PIRs	Assumptions: Sufficient information and confidence across the industry to engage.  Risks: The buyer requirements are difficult to achieve
<b>Outcome 5.1:</b>  Full participation in IW:LEARN and knowledge management /communication			
<b>Outputs</b>			

<p>5.1.1: Participation in two IW:LEARN regional meetings, one GEF Biennial International Waters Conference (IWC) delivering IW:LEARN experience notes, and in the East Asian Seas (SEAS) Congress by the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)</p> <p>(Indonesia and Timor-Leste)</p>	<p>Best practices in feed supply management shared in various international fora as well as Asia-Pacific aquaculture fora such as World Aquaculture or Asia-Pacific Aquaculture leading to creation of community of practice</p> <p><u>Gender indicator:</u></p> <p>Women and women's organizations are targeted for sharing of good practice. Youth groups, where possible included</p> <p>Knowledge products are developed through gender lens and disseminated to target audiences, including women, women-based organizations, and youth where possible.</p>	<p>Conference proceedings</p> <p>Knowledge products are developed and disseminated.</p> <p>Project reporting including PIRs</p>	<p>Assumptions: Industry and supply chain buyers are interested in adopting best practices</p> <p>Risks: The limited willingness of representatives of the sector to share information on best practices</p>
<p>5.1.2 Sharing of good practice across GEF-supported large marine ecosystem (LME) / regional SEAS programmes in Asia and the Pacific, including ISLME, Gulf of Thailand (GOT), Bay of Bengal (BOBLME), Sulu Celebes Sea (SCS), Arafura and Timor Seas Ecosystem Action Programme (ATSEA), Yellow Sea LME, and others ? with focus on strategic action programme (SAP) implementation</p>	<p>Best practices in feed supply management shared across the regional LMEs where seaweed and shrimp production is important to the economy</p>	<p>Conference proceedings</p> <p>Knowledge products developed and disseminated</p> <p>Project reporting including PIRs</p>	<p>Assumption: MAF is willing to facilitate and coordinate a community of practice for Shrimp Feed production</p> <p>Risks: Lack of interest by the Industry in community of practice</p>

<p>5.1.3 Knowledge management and communications products, such as,</p> <p>a. Lessons on improved production techniques, EEA, MSP, private sector engagement, the feasibility of carbon markets, supply-demand models for different seaweed products for Timor-Leste</p> <p>b. Lessons on aquaculture policy and strategic directions for Indonesia ? with the inclusion of improved tracking of feed through shrimp aquaculture supply chains</p>	<p>Lessons learned and knowledge shared through at least 15 knowledge products</p> <p>MMAF commits to implementing traceability of feeds by 2027</p>	<p>Knowledge products prepared and disseminated</p> <p>Media reports</p> <p>Project reporting including PIRs</p> <p>PCC meetings</p> <p>Mid term review and Terminal Evaluation</p>	<p>Assumptions: S takeholders in Timor-Leste, Indonesia, as well as actors across the supply chain, adopt good practices</p>
<p><b>Outcome 6</b></p> <p>Output 6.1 Monitoring and Evaluation conducted</p>	<p>Mid Term Review</p> <p>Terminal Evaluation</p>		

## ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

### ANNEX B: Response to Project Reviews

#### ADB Response to GEF Council Comments

Country	Comments	Response
---------	----------	----------

## **Canada**

Canada supports this Project, which will help stop the expansion of unsustainable aquaculture industries through value chain intervention in Indonesia and improve sustainable seaweed practices in East Timor.

. We believe it is essential to make a clear link between the project in Indonesia (Shrimp) and Timor Leste (Seaweed) to make it a regional project and avoid two stand alone projects. We understand that Indonesia has a lot to offer in terms of lessons learned in seaweed production, and there needs to be creative knowledge sharing, mainly from Indonesia to Timor Leste.

?We believe that this Project will fit well with the existing projects from other partners, including the Asian Development Bank (ADB) initiative on shrimp feed traceability system and the World Wildlife Fund's (WWF) terrestrial and marine ingredient engagements. We agree that this integration is vital to ensure the global suitability of the proposed GEF project.

?We note that the implementation of the Project in Indonesia will likely face challenges should it disrupt current efforts by the Government of Indonesia to improve the overall ease of doing business in support of economic growth, especially under national job creation legislation.

We would urge that the Project find an innovative way to work with the government on this issue.

?One of the issues with aquaculture practices in Indonesia is the low recognition of women's role in aquaculture as they are mostly treated as a helper

In addition to alignment between the overarching ISLME Theory of Change, the nesting of this GEF Project coordination within the overall ISMLE Coordination Committee, this has been addressed. There will also be a single international Senior Technical Advisor that will straddle both countries to ensure cohesion as well as provide technical direction in the two commodities / value chains in each of the countries.

WWF's Terrestrial and marine ingredient engagement work has been a great source of support and laid excellent foundations for this work.

The national job creation legislation is currently under hold as the Constitutional court has asked for its review over the next two years before approval. However, we are discussing with the Indonesian Government team how to mitigate any impacts should the situation change. The Project remains open to innovations as the feedback from the constitutional court is integrated into the legislation.

We fully agree with the low recognition of women's role in aquaculture, the Project has made efforts to incorporate the gender action plan across the whole Project. We would also note that the Project only concerns the supply of feed from wild fish to the shrimp feed facilities. The Project expects to find a similar gender situation in the supply chains. It will ensure we also recognize the women's significant role at

	<p>only, despite them contributing to productive activities. Therefore, we would strongly suggest that project implementers make efforts to improve recognition of women's important role in the sector.</p>	<p>that end of the shrimp feed supply chain in all project activities.</p> <p>Output 5.1.3 includes opportunities for creative knowledge sharing between Indonesia and Timor Leste on seaweed farming (e.g. COREMAP-CTI) and a budget has been allocated for exchange visits. Furthermore, later in the project life, we will make efforts to include participation of the private company Sea Green, which operates in Indonesia and has interests in the Timor-Leste market. The GEF project has committed to have 2 off-take agreements for Timorese producers and it is expected that this will be facilitated by Sea Green and others based in Indonesia. (<a href="http://www.sea.green">www.sea.green</a>)</p>
--	--	---



## **Germany**

### **Comments**

Germany approves the following PIF in the work program but asks that the following comments are taken into account:

Suggestions for improvement to be made during the drafting of the final project proposal:

?A key assumption in the PIF is that the lack of accountability in the Indonesian shrimp feed sector leads to overfishing and continuation of IUU fisheries in the ISLME. This assumption is plausible. However, it is accompanied by the risk that chain-of-custody certification with more transparency and accountability in the Indonesian shrimp feed sector could rather induce key players in the feed sector to secure alternative sources for fish-meal and fish-oil (including imports) originating from sustainable fisheries than putting pressure on current unsustainable supply sources to stop harmful practices as they too could join alternative markets with less governance. Germany recommends dealing with risks, as well as associated risk mitigation measures, of supply substitution over sustainable supply transformation.

? Regarding the proposed "feed to shrimp tracking systems", which will be modeled off the Seafood Task Force's Feed Information Form, Germany suggests initiating an exchange of experience with Indonesian companies or 'chains-of-custody' that are ACS or BAP certified and thus have become local knowledge carriers for the operationalization of tracking systems. According to the proposal, there have not yet been any consultations with these actors or on this topic other than with STF (not yet operating in Indonesia).

Agreed, as part of this work in Output 2.1.4. The Project will conduct a full policy review and recommend a definition in law of "trash fish". The project design team meetings concluded that there is currently no definition of trash fish in Indonesian law or fisheries policy.

Output 2.1.4 d will identify potential incentives to support transition to "better" alternative sources. This output will identify disincentives to reduce the use of these cheaper and lower-governed feed sources.

Output 2.1.4 c will also look for local and cheaper alternative sources to fish feeds. If there is success with these, we can expect market and price to drive a shift to these.

The exchange of experience between Indonesian companies has begun initially (on a trip in September 2022). As correctly stated. However, that has not included a BAP or ASC-certified facility (however, there are currently no ASC-certified facilities in Indonesia).

The ASC feed standard version 1.0 became effective on January 14th, 2023, and feed mills will become eligible for certification ([www.asc-aqua.org](http://www.asc-aqua.org)). Upon reaching that date, farms will have 24 months to switch to ASC-compliant feed to continue meeting the ASC Farm Standards. The Project's timing fits with ASC's feed timeline exceedingly well.

		Future project preparation activities will work with the project implementers to begin the engagement of local knowledge carriers as recommended and integrate this into the project plan.
<p><i>Norway and Denmark</i></p> <p>Comments</p>	<p>? It is good that the Project takes into account different focuses based on the objectives of the country plans of both Indonesia and Timor-Leste. Indonesian aquaculture farming is more on the intensification and extensification of farming production, especially on two main species such as shrimp and seaweed because Indonesia is the second largest producer of these. Meanwhile, in Timor-Leste, the aquaculture is as part of a strategy for food security and combatting malnutrition.</p> <p>? Therefore, the proposed project interventions are in line with the national plans and strategies.</p> <p>? The Project also connects with relevant stakeholders in the country such as relevant and strategic ministries, private sectors and civil society related to the sector, and all of them are strategic partners for the Project to reach its objectives.</p>	<p>Although the two countries have different objectives for their work (Shrimp vs. Seaweed), there is much they can learn from each other and share (both on seaweed and shrimp) and country to country.</p> <p>The ISLME program, managed by FAO will be the framework for this integration.</p> <p>This cross learning will be supported through the project, but importantly within the overarching ISLME Strategic Action Programme / Plan SAP</p>

**United Kingdom** Comments

Will this Project only work with existing shrimp and seaweed aquaculture initiatives or engage planned projects to focus on avoiding conversion? How will the project work with input producers, as the market is not close to sustainable supply?

The Project will work with existing shrimp initiatives and engage in new projects in seaweed. The conversion of mangroves in Indonesia for shrimp ponds or other uses is banned by law and enforced by the MMAF (the Ministry tasked with implementing this Project). As the Project begins, it will learn more about the input producers (currently, there is very little information in either Government statistics or the literature on the input producers). Only by working with the feed mills and understanding who and what they are sourcing will the Project be able to catalyze and incentivize a shift to more sustainable supply.

Output 2.1.1 will work on a mass balance protocol with two "Early adopter" feed mills, members of the Feed Mill association of Indonesia. The Knowledge Management system will showcase the benefits and early adopters of the mass balance protocol to aid replication

Output 5.1.3 will ensure broad dissemination of the lessons learned and best practices for adoption by other feed mills.

The seaweed project will work with existing and planned projects (e.g., MDF, WorldFish)

Inputs for seaweed farming are minimal. Efforts are focused on supporting MAF to establish a quality seedstock nursery of improved cultivars to distribute to farmer groups.

## ADB Responses to STAP Review

<b>Part I: Project Information</b>	<b>Response</b>		<b>ADB RESPONSES</b>
<b>GEF ID</b>	10867		
<b>Project Title</b>	Towards Sustainable and Conversion-Free Aquaculture in Indonesian Seas Large Marine Ecosystem (ISLME)		
<b>Date of Screening</b>	November 5, 2021		
<b>STAP member screener</b>	Blake Ratner		
<b>Part I: Project Information</b> <b>B. Indicative Project Description Summary</b>	<b>What STAP looks for</b>	<b>Response</b>	
<b>STAP secretariat screener</b>	Virginia Gorsevski		

STAP Assessment Rating	Overall and	Concur.	
	<p>Highly innovative (and suitably high risk) project with strong understanding of the problems and barriers that takes advantages of national strategies in Indonesia and Timor-Leste related to the shrimp and seaweed industries, respectively. Very good scope to deliver lessons and pilot solutions of global significance.</p> <p>While the main objectives are clear and follow the problem analysis, the PIF would benefit greatly from a clearer storyline and logic, particularly regarding the integration of the two country interventions.</p> <p>Makes a strong case for added value of the GEF (and its relatively small investment in relation to the large ADB country investments in the aquaculture sector) in terms of comparative advantage related to its convening role and ability to provide a platform and a bridge between national governments and the private sector.</p>		

Project components	A brief description of the planned activities. Do these support the project's objectives?	Yes.	
Outcomes	<p>A description of the expected short-term and medium-term effects of an intervention.</p> <p>Do the planned outcomes encompass important adaptation benefits?</p>	Clearly presented.	
	Are the global environmental benefits/adaptation benefits likely to be generated?	Depends significantly upon shifts in private sector investment.	
Project Objective	Is the objective clearly defined, and consistently related to the problem diagnosis?	The objective of this project is ?to alter the trajectory towards more sustainable and conversion-free aquaculture production within the Indonesia Seas Large Marine Ecosystem (ISLME).? The objective is clear and related to the problems regarding lack of transparency and accountability in the shrimp sector and inadequate markets for seaweed.	

Outputs	<p>A description of the products and services which are expected to result from the project.</p> <p>Is the sum of the outputs likely to contribute to the outcomes?</p>		
<b>Part II: Project justification</b>	A simple narrative explaining the project's logic, i.e. a theory of change.		
<b>1. Project description. Briefly describe:</b> 1) the global environmental and/or adaptation problems, root causes and barriers that need to be addressed (systems description)	<p>Is the problem statement well-defined?</p>	<p>Yes. The problems are clearly outlined as are the barriers. For example, in the shrimp industry, the main barriers to greater feed accountability are mainly government policy and oversight as well as lack of transparency and traceability in the supply chain.</p> <p>Conversely, for the seaweed industry, the main barrier is the ??inability to demonstrate and share knowledge on better post-harvest handling of seaweeds and farmers beholden to the traders that purchase product.?</p>	

	Are the barriers and threats well described, and substantiated by data and references?	Yes.	
	For multiple focal area projects: does the problem statement and analysis identify the drivers of environmental degradation which need to be addressed through multiple focal areas; and is the objective welldefined, and can it only be supported by integrating two, or more focal areas objectives or programs?	N/A	
2) the baseline scenario or any associated baseline projects	Is the baseline identified clearly?	Yes in terms of the current situation and market trends related to shrimp seaweed production, with very good visualization of data. This is also true for the many related projects and initiatives.	
	Does it provide a feasible basis for quantifying the project's benefits?	Yes.	
	Is the baseline sufficiently robust to support the incremental (additional cost) reasoning for the project?	Yes.	
	For multiple focal area projects:		



	are the multiple baseline analyses presented (supported by data and references), and the multiple benefits specified, including the proposed indicators;	N/A	
	are the lessons learned from similar or related past GEF and non-GEF interventions described; and	N/A	
	how did these lessons inform the design of this project?	N/A	

<p>3) the proposed alternative scenario with a brief description of expected outcomes and components of the project</p>	<p>What is the theory of change?</p>	<p>The theory of change diagrams presented for both Indonesia (shrimp) and Timor-Leste (seaweed) are less ToCs than a general depiction of the role of different actors and activities and connections among outcomes. More information is needed to articulate the overall objective and how activities support it, what are the barriers addressed, underlying assumptions, causal pathways, etc. See <a href="#">STAP Theory of Change Primer</a>. It is fine to show the country-level ToCs but ideally these should align with a ToC for the overall project investment.</p>	<p>The narrative for the Timor-Leste seaweed ToC has been revised to highlight the main constraints and how the barriers will be addressed following causal pathways (outputs to outcomes). The discussion is supplemented by presentation of the state of affairs regarding artisanal seaweed cultivation in the project areas, and presentations a SWOT analysis,</p> <p>The Shrimp Indonesia narrative has been revised to include further discussion around the constraints and how the project outputs will overcome those. Smallholder farming profitability is constrained by the lack of economy of scale, limited access to finance, unsustainable farming infrastructure and practices, and low bargaining power with aggregators. The low level of certification of farmers, aggregators, and processors also limit the ability to properly trace products, further limiting international buyers' confidence. As the demand for sustainability grows, there is a need to shift toward responsible and transparent production and sourcing of feeds.</p> <p>The GEF project TOC is also presented as a sub-set of the overarching ISLME TOC. The ISLME TOC (prepared by FAO) is complex and presented in Excel format in the Portal Roadmap section, In the preamble to the Alternative Scenario we have presented a TOC for this GEF project (10867) which fits within the overall ISLME framework TOC ? as such the 10867 TOC is nested within the overall ISLME TOC.</p>
---	--------------------------------------	---	--

	<p>What is the sequence of events (required or expected) that will lead to the desired outcomes?</p>	<p>This is difficult to assess for the project as a whole as there are two separate activities taking place ? one related to the shrimp sector in Indonesia and the other related to seaweed production in Timor Leste. The points of integration need further development. Presumably this primarily concerns aspects related to market and value-chain development.</p> <p>There may also be technical scope to consider linkages relating to feed and production systems. See, for example, evaluation studies on seaweed as an ingredient in shrimp feed (<a href="#">Felix et al., 2020</a>, <a href="#">Elizondo-Gonzalez et al., 2020</a>, <a href="#">Omont et al., 2018</a>, etc.) and reports on using integrated multi-trophic aquaculture which includes both shrimp and seaweed farms (<a href="#">Araujo do Amaral Carneiro et al., 2020</a>, <a href="#">Verdien et al., 2020</a>, etc.)</p>	<p>Under the Global Baseline Scenario for seaweed - information has been added on the use of seaweed in shrimp feeds and also in Integrated Multi-Trophic Aquaculture systems</p>
--	--	---	---

	What is the set of linked activities, outputs, and outcomes to address the project's objectives?	Individual outcomes and outputs are well-described, including approaches to scaling.	
	Are the mechanisms of change plausible, and is there a well-informed identification of the underlying assumptions?		
	Is there a recognition of what adaptations may be required during project implementation to respond to changing conditions in pursuit of the targeted outcomes?	The risk section provides ?counter measures? that will be enacted to mitigate the many (high) risks associated with the project but it is not clear what adaptations may need to occur if these measures are not or only partially effective.	<p>The Risks section has been improved with more relevant risks for seaweed and the consolidation of several covid-related risks into one risk.</p> <p>In summary standard prevention and response measures will be included in project administration guidance. The project will comply with international (WHO), national and local policies, protocols and practices to the extent possible. Some measures would include: i) provision of appropriate protective equipment (masks, gloves, sanitation devices), ii) limitation of face to face interaction (e.g. including social distancing) and shift to hybrid or on-line forms of work, iii) limitations on local and international travel, iv) regular antigen testing regimen, and v) strong and regular monitoring and reporting practices.</p>
5) incremental/additional cost reasoning and expected contributions from the baseline, the GEF trust fund, LDCF, SCCF, and cofinancing	GEF trust fund: will the proposed incremental activities lead to the delivery of global environmental benefits?	Yes	

	LDCF/SCCF: will the proposed incremental activities lead to adaptation which reduces vulnerability, builds adaptive capacity, and increases resilience to climate change?	N/A	
6) global environmental benefits (GEF trust fund)  and/or adaptation benefits (LDCF/SCCF)	Are the benefits truly global environmental benefits/adaptation benefits, and are they measurable?	Yes	
	Is the scale of projected benefits both plausible and compelling in relation to the proposed investment?	Yes (vis-?-vis the GEF investment which is leveraging a substantial ADB loan)	
	Are the global environmental benefits/adaptation benefits explicitly defined?	Yes	
	Are indicators, or methodologies, provided to demonstrate how the global environmental benefits/adaptation benefits will be measured and monitored during project implementation?	Yes	

	<p>What activities will be implemented to increase the project's resilience to climate change?</p>	<p>Resiliency is described in relation to the potential positive impacts that this project could have if successful ? for example preserving mangroves as a natural climate solution.</p> <p>For both Indonesia and Timor Leste, a climate risk screening is provided that demonstrates a solid understanding of how each of the sectors is impacted by climate change and how these projects will respond. For the shrimp farms, water quality is critical and this can be negatively impacted by changing water temperatures or other conditions caused by climate variability and long term climate change.</p>	
--	--	--	--

<p>7) innovative, sustainability and potential for scaling-up</p>	<p>Is the project innovative, for example, in its design, method of financing, technology, business model, policy, monitoring and evaluation, or learning?</p>	<p>This is a high risk, high potential reward project that his innovative in working along the shrimp production supply chain, which if successful has the potential to alter the BAU trajectory of traditional aquaculture inputs which is associated with widespread negative human and natural consequences.</p> <p>Similarly, for the seaweed production activities in Timor Leste, which if successful could be highly beneficial for local and national stakeholders as well as the global environment and has the potential for replicability in other areas.</p>	
	<p>Is there a clearly-articulated vision of how the innovation will be scaled-up, for example, over time, across geographies, among institutional actors?</p>		

	Will incremental adaptation be required, or more fundamental transformational change to achieve long term sustainability?	Transformational change will be needed to achieve long term sustainability.	
<b>1b. Project Map and</b>  Coordinates. Please provide geo-referenced information and map where the project interventions will take place.		A map is provided with coordinates for proposed project sites in Indonesia and Timor Leste.	
<b>2. Stakeholders.</b>  Select the stakeholders that have participated in consultations during the project identification phase: Indigenous people and local communities; Civil society organizations; Private sector entities. If none of the above, please explain why. In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.	Have all the key relevant stakeholders been identified to cover the complexity of the problem, and project implementation barriers?	Key stakeholder categories are identified with some detail for each with the exception of local communities, whose role in this project is not well defined.	Local communities are now included for both TL and INO (though not much touchpoints directly for Shrimp with local farmers)  A description of seaweed farmers and farming in Timor is now included in the Baseline Scenario.  The discussion covers seaweed farming methods in the project areas, estimates on cost of goods sold and gross margins, post-harvest handling practices, seaweed farmer organizations status, structure of the seaweed trade, regulatory issues and socio-cultural factors which affect the trade.



What are the stakeholders? roles, and how will their combined roles contribute to robust project design, to achieving global environmental outcomes, and to lessons learned and knowledge?		The 'Perspectives on Gender and Seaweed Farming in Project Areas of Timor Leste' is now included in the report with references to other studies	
--	--	---	--

<p><b>3. Gender Equality and Women's Empowerment.</b></p> <p>Please briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis). Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes/no/ tbd.</p> <p>If possible, indicate in which results area(s) the project is expected to contribute to gender equality: access to and control over resources; participation and decisionmaking; and/or economic benefits or services. Will the project's results framework or logical framework include gendersensitive indicators? yes/no /tbd</p>	<p>Have gender differentiated risks and opportunities been identified, and were preliminary response measures described that would address these differences?</p>	<p>The disadvantaged situation of women in these sectors of these countries is well described, particularly in relation to the power wielded by the ?middlemen.?</p> <p>The proposed solutions (prior to developing a gender plan) are preliminary (increase gender awareness, gender analysis, etc.) and do not directly address the root causes of inequity such as lack of access to financial resources and limited decision making power.</p> <p>Referencing studies focusing on women's involvement in seaweed farming (<a href="#">Larson et al. 2021</a>, <a href="#">Vipinkumar et al., 2020</a>, <a href="#">Ramirez et al., 2019</a>, etc.), for example, could provide relevant guidance to integrate in gender analysis.</p>	<p>The narrative on gender equality has been supplemented in the CER. It provides a section on sex-differentiated roles by sector, additional discussion on changing the division of labour in the aquaculture supply chain, increasing access and control over resources, enhancing women's social status and role as decision makers in sustainable aquaculture, and Executing Agency (EAs) capacity to encourage and supervise gender action plan implementation.</p> <p>The GAP addresses some key root causes by: i) Ensuring that gender analyses and assessments for shrimp and seaweed aquaculture value chains are included in the Action Plans, ii) Encouraging formulation of gender targets in national action plan for shrimp aquaculture, iii) Ensuring that at least 30% of trainees covering STF requirements are women, iv) Ensuring that Shrimp Feed Action Plan, part of the National Shrimp Aquaculture Action Plan, includes gender dimensions (and targets if possible), v) considering gender roles in supply chain validation exercises, vi) Ensuring that workshops in some outputs include at least 40% women, vii) Insisting that management planning and demonstration activities in Atauro and Metinaro include at least 50% women in the consultations, and encourage / support women-based enterprises in the seaweed sector, viii) Encouraging at least 50% women's participation in demonstration of production and post-harvest handling in seaweed aquaculture sites, ix) Following inclusive approaches to ensure participation of at least 40% women in the strengthening of the capacity of seaweed farmer groups, x) Supporting at least 3</p>
--	---	---	---

			women-led seaweed farmer groups aggregating seaweed for the market, xi) Communicating project work and results equally across men and women as part of the KMS..
	Do gender considerations hinder full participation of an important stakeholder group (or groups)? If so, how will these obstacles be addressed?	Yes. Through a ?gender action plan.?	

<p><b>5. Risks.</b> Indicate risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the project design</p>	<p>Are the identified risks valid and comprehensive? Are the risks specifically for things outside the project's control? Are there social and environmental risks which could affect the project? For climate risk, and climate resilience measures: ? How will the project's objectives or outputs be affected by climate risks over the period 2020 to 2050, and have the impact of these risks been addressed adequately? ? Has the sensitivity to climate change, and its impacts, been assessed? ? Have resilience practices and measures to address projected climate risks and impacts been considered? How will these be dealt with? What technical and institutional capacity, and information, will be needed to address climate risks and resilience enhancement measures?</p>	<p>There are numerous risks identified that apply to both sub projects as well as specific to each. Many of them are rated high.</p> <p>A detailed country risk profile for both Indonesia and Timor Leste is provided.</p>	
---	--	---	--

<p><b>6. Coordination.</b> Outline the coordination with other relevant GEF-financed and other related initiatives</p>	<p>Are the project proponents tapping into relevant knowledge and learning generated by other projects, including GEF projects?</p>	<p>Yes. There is strong awareness of past and ongoing projects that are relevant to these two sectors as well as initiatives such as Safe Seaweed Coalition, etc. In particular the GEF-7 Blue Horizon project for seaweed aquaculture.</p>	
	<p>Is there adequate recognition of previous projects and the learning derived from them?</p>	<p>There is adequate recognition of other related efforts to improve transparency, including certification projects that failed.</p>	
	<p>Have specific lessons learned from previous projects been cited?</p>		
	<p>How have these lessons informed the project's formulation?</p>		
	<p>Is there an adequate mechanism to feed the lessons learned from earlier projects into this project, and to share lessons learned from it into future projects?</p>	<p>Yes</p>	

<p><b>8. Knowledge management.</b> Outline the</p> <p>?Knowledge Management Approach? for the project, and how it will contribute to the project?s overall impact, including plans to learn from relevant projects, initiatives and evaluations.</p>	<p>What overall approach will be taken, and what knowledge management indicators and metrics will be used?</p>	<p>Knowledge management will be supported under Component 5 of the project.</p>	
	<p>What plans are proposed for sharing, disseminating and scaling-up results, lessons and experience?</p>		

**ANNEX C: Status of Utilization of Project Preparation Grant (PPG).**  
**(Provide detailed funding amount of the PPG activities financing status in the table below:**

Amounting to USD 137,615	
<i>Project Preparation Activities Implemented</i>	<i>GEF Amount (\$)</i>

	<i>Budgeted Amount</i>	<i>Amount Spent to date</i>	<i>Amount Committed</i>
<i>Consultants (ADB)</i>			
ADB/ GEF Sustainable Aquaculture Development Specialist (INO)	75,750	42,729	33,021
ADB/ GEF Seaweed Value Chain Specialist (TIM)	55,450	41,970	13,480
ADB/ GEF Project Coordinator -Seaweed Value Chain (TIM)	6,402	6,402	0
Unallocated	13	0	0
Total	137,615	91,101	46,501

All three consultants contributed to project preparation. The ADB/GEF Sustainable Aquaculture Development Specialist acted as Team Leader and provided technical direction for both countries, with focus on work in Indonesia. The ADB/GEF Seaweed Value Chain Specialist focused on preparation mainly in Timor-Leste. The ADB Indonesia Resident Mission and Timor-Leste Resident Mission provided logistical support - although an additional coordinator was required in Timor-Leste to facilitate coordination with local artisanal seaweed cultivators at site level. In Indonesia meetings were also facilitated by the MMAF. The two technical specialists have yet to invoice for the balance of work. There are still funds remaining under the contract of the ADB/GEF Sustainable Aquaculture Development Specialist. He will continue preparatory activities over the next two to three months which will include additional consultations with the Directorate General for Competitiveness in MMAF to look at product and marketing issues; and also continue research and consultations into the design of the Pilot on ?trash fish? traceability (under Component 2) as this is a critical element of the work in Indonesia.

#### **ANNEX D: Project Map(s) and Coordinates**

**Please attach the geographical location of the project area, if possible.**



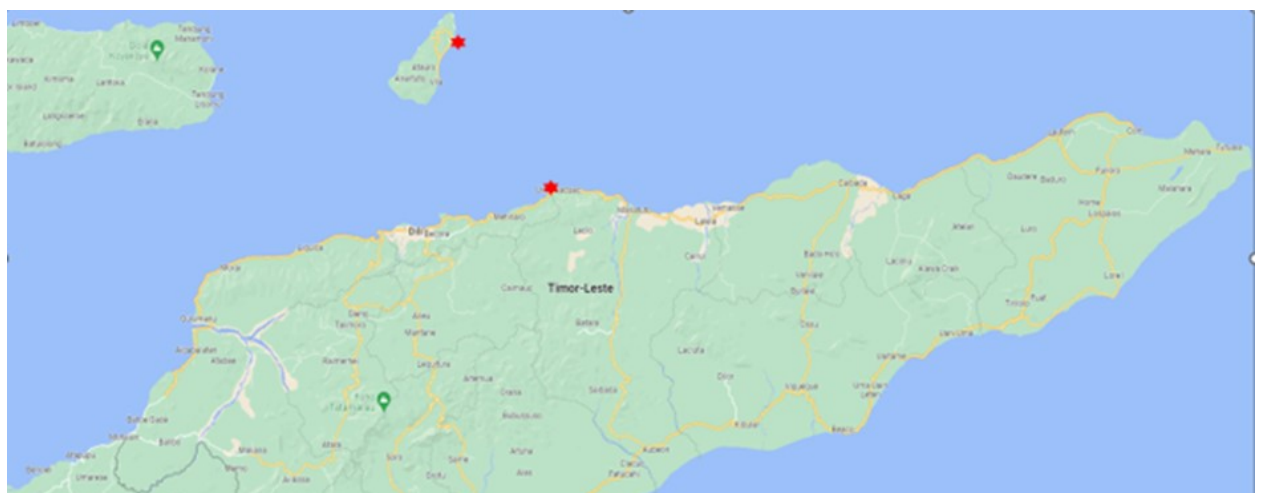




Map showing ADB Loan project sites and focal sites for Outcome 4.1 (Jawa Barat, Jawa Timur, Lampung, and Sulawesi Selatan) Source: KKP No geocoordinates yet available until the five supply chain pilot sites are identified (INO)

### Timor Leste

The map below shows the seaweed production sites that will be covered by the project. Coordinates are provided below the map.



Source: Google Maps

Aldeia/Municipality	Latitude	Longitude
Biqueli, Atauro	-8.18065	125.63386
Manuleu, Metinaro	-8.49003	125.82426

Coordinates for the seaweed production sites

## ANNEX E: Project Budget Table

Please attach a project budget table.

Expenditure Category											Total (USD eq.)	Responsible Entity			
	Component 1		Component 2		Component 3		Component 4		Component 5		Sub-Total	M & E	P M C	(Executing Entity receiving funds from the GEF Agency)[1]	
	Outcome 1.1 (INO)	Outcome 1.1 (TI M)	Outcome 2.1 (INO)	Outcome 3.1 (TI M)	Outcome 3.2 (TI M)	Outcome 4.1 (TI M)	Outcome 4.2 (INO)	Outcome 5.1 (TI M)	Outcome 5.1 (INO)						

<b>Works</b>	Seaweed storage warehouses for farmer groups (20 groups @ \$3888.10/group) (TIM)						77,762				77,762			MAF
											-			
<b>Goods</b>											-			
	Seaweed dryers for farmer groups (20 groups @ \$500/group) (TIM)						10,000				10,000			MAF
	Seaweed demo inputs (e.g. rope and bamboo for 300 farmers) (TIM)					209,950					209,950			MAF
	MAF managed seaweed seed nursery (establish seaweed bed for testing and multiplying new cultivars) (TIM)					50,000					50,000			MAF

	Production of lessons learned products (knowledge management) (TIM)								26,833		26,833			MAF
<b>Vehicles</b>											-			
<b>Grants/ Sub-grants</b>	Grants for research on alternative feeds (Pilot #3) to universities, CSOs, NGOs, private sector (INO)			400,000							400,000			MMAF
<b>Revolving funds / Seed funds / Equity</b>											-			
<b>Sub-contract to executing partner/ entity</b>											-			
<b>Contractual Services ? Individual</b>	Shrimp Value Chain Specialist (for Shrimp Action Plan) (INO)	27,000									27,000			BAPPENAS

	Marketing Specialist for Shrimp Action Plan	19,800								19,800			BAP PEN AS
	Aquaculture Feed Specialist (INO) for Mass Balance Work			39,600						39,600			MM AF
	Economist for Mass Balance Work (INO)			39,600						39,600			MM AF
	Feed and Logistics Specialist for Mass Balance Work and Systems Gap Analysis (INO)			79,200						79,200			MM AF
	Industry Source Ingredient Specialists (2) - Poilcy Pilot (INO)			39,600						39,600			MM AF
	Field Observers / Researchers (Trash Fish Pilot) (INO)			88,000						88,000			MM AF

Contractual Services ? Company											-			
	Marketing Communications Firm for Shrimp Aquaculture Action Plan (INO)			150,000							150,000			BAPPENAS
	Laboratory testing for trash fish pilot (INO)			30,000							30,000			MMAF
	Monitoring implementation of Feed to Shrimp Tracking System (INO)			43,080							43,080			MMAF
	Monitoring and surveillance of shrimp traceability as per STF buyer inputs							46,500			46,500			MMAF
	Design, layout, publishing of knowledge products (INO)									20,000	20,000			MMAF

	Audio-Visual production on feed to shrimp supply chain (INO)									55,000	55,000			BAP PEN AS
	Networking services from established organisations such as SSC and JaSuDa (TIM)						20,000				20,000			MA F
<b>Inter national Cons ultants</b>											-			
	Senior Technical Advisor (INO)			140,800							140,800			MM AF
	Shrimp Feed Sourcing Specialist (INO)			14,300							14,300			MM AF
	Mass Balance Specialist (INO)			52,800							52,800			MM AF
	Fisheries Supply Chain Specialist (Trash Fish) INO			52,800							52,800			MM AF

	Monitoring and Evaluation Specialists (INO)										-	70,000		ADB (INO)
	Monitoring and Evaluation Specialists (TIM)										-	30,000		ADB (TIM)
	Senior Technical Advisor cum Aquaculture seaweed strategy specialist (TIM)		30,000			60,000					90,000			MAF
	Quantification of ecosystems valuation specialist ((TIM)				15,000						15,000			MAF
	Policy & regulatory analyst (TIM)				15,000						15,000			MAF
<b>Local Consultants</b>	Shrimp Marketing and Economics Specialist (INO)	70,400									70,400			BAPPENAS
	Shrimp Feed Sourcing Specialist (INO)			15,400							15,400			MMAF



	Aquaculture Development Planning Specialist (INO)	77,000								77,000			BAPPENAS
	Environment Specialist (INO)	33,000								33,000			BAPPENAS
	Assorted technical specialists and support personnel (as needed)			12,200						12,200			MMAF
	Assorted technical specialists and support personnel (as needed)	22,000								22,000			BAPPENAS
	Aquaculture Certification Specialist (for Mass Balance) (INO)			5,250						5,250			MMAF
	Supply Chain Specialist INO (STELINA)			39,600						39,600			MMAF
	IT Specialist (STELINA) (INO)			33,000						33,000			MMAF

	Aquaculture Specialist (STELINA) (INO)			33,000						33,000			MM AF
	Knowledge Management specialist (INO) BAPPENAS	30,000		16,000				36,000		82,000			BAPPENAS
	Knowledge Management specialist (INO) MMAF							38,000		38,000			MM AF
	Supply Chain Specialist (Policy/Regulatory) (INO)	26,400								26,400			BAPPENAS
	Aquaculture Regulatory Specialist (Policy Pilot) (INO)	26,400								26,400			BAPPENAS
	Shrimp Aquaculture Feed Specialist (Policy Pilot) (INO)			26,400						26,400			BAPPENAS
	Fisheries Supply Chain Specialist (Trash Fish) (INO)			39,600						39,600			MM AF

	Conservation Finance Specialist (Pilot #4) (INO)			39,600						39,600			BAPPENAS
	Business / Fund Management Specialist (Pilot #4) (INO)			39,600						39,600			BAPPENAS
	Financial Regulations Specialist (Pilot #4) (INO)			39,600						39,600			BAPPENAS
	Policy Specialist (Trash Fish) (INO)			16,500						16,500			MMAF
	Knowledge Management specialist (TIM)							17,000		17,000			MAF
	Gender equality specialist (TIM)				7,000					7,000			MAF
	Gender equality specialist (INO)						20,540			20,540			MMAF
<b>Workshops, Training etc</b>	Indonesia (Shrimp Aquaculture Strategy and Action Plan) (INO)	144,000		42,190						186,190			BAPPENAS

	Seafood Task Force Trainings (INO)			36,800						36,800			MM AF
	Trainings on Mass Balance Protocol			18,500						18,500			MM AF
	Workshops to upgrade STELIN A System (INO)			17,500						17,500			MM AF
	Focus Group Meetings to support Policy Pilot (INO)			18,500						18,500			BAP PEN AS
	Stakeholder consultations, group discussions and workshops on trash fish pilot (INO)			57,900						57,900			MM AF
	Workshop on alternative feed ingredient sources (Pilot #3) (INO)			10,000						10,000			MM AF

	Worksh ops on Conserv ation finance to support Feed to Shrimp Supply Chain (Pliot #4) (INO)			35,0 00						35,0 00			BAP PEN AS
	Worksh ops on Conserv ation finance to support Feed to Shrimp Supply Chain (Pliot #4) (INO)			35,0 00						35,0 00			MM AF
	Trainin g on impleme ntation of feed to shimp tracking system (INO)						50, 00 0			50,0 00			MM AF
	Pre-and Post Inspecti ons by Seafood Task Force (INO)						20, 00 0			20,0 00			MM AF

	Industry - Government Roundtable Meetings on Feed to Shrimp Traceability (INO)							60,960			60,960			MMAF
	National Aquaculture Seaweed Strategy stakeholder meetings & consultations (3 stakeholder workshops to present baseline, prepare strategy and validation (TIM)		30,000								30,000			MAF
	National Aquaculture Seaweed Strategy public awareness raising campaign (TIM)		10,000								10,000			MAF
	IW:LEARN and GEF IWC Participation (TIM)								16,167		16,167			MAF

	Regional LME Meetings (TIM)								30,000		30,000			MAF
	Participate in PEMSEA EAS congress attendance and associated costs INO / TIM (7500 ALLOCATED TO ino, 50,000 to TIM)								20,000		20,000			MAF
	Lessons learned sharing publications (TIM)										-			MAF
	Training seaweed farmer groups (organizational strengthening for market linkages) (TIM)						21,200				21,200			MAF
	Training seaweed traders in contract brokerage and export procedures (TIM)						8,080				8,080			MAF

	Three GEF7 Blue Horizon workshops (TIM)					15,500				15,500			MAF
	Workshop for quantification of ecosystem services (TIM)				3,150					3,150			MAF
	Environmental Approach Aquaculture marine planning exercises at six locations @ \$40,000 each (TIM)					240,000				240,000			MAF
	Capacity building for NDFA in sustainable marine resource management (TIM)					93,000				93,000			MAF
	Production training for 300 farmers (TIM)					106,900				106,900			MAF



	Capacity building for NDFA and private sector support services related to seaweed (TIM)					100,000					100,000			MAF
<b>Travel</b>											-			
<b>International</b>											-			
	International Travels - Shrimp Aquaculture Strategy and Action Plan (INO)	24,000		24,000							48,000			BAPPENAS
	Buyer Visits (INO)			25,000							25,000			MMAF
	IW:LEARN and GEF IWC Participation - BAPPENAS (INO)									47,500	47,500			BAPPENAS
	IW:LEARN and GEF IWC Participation MAF (INO)									47,500	47,500			MMAF

	Regional sharing across LMEs - BAPPENAS (INO)									32,500	32,500			BAPPENAS
	Regional sharing across LMEs - MMAF (INO)									32,500	32,500			MMAF
<b>Domestic</b>											-			
	Buyer Visits (INO)			6,280							6,280			MMAF
	Field Visits - Seafood Task Force (INO)			27,800							27,800			MMAF
	Field travel for trash fish research team (INO)			20,000							20,000			MMAF
<b>Office Supplies</b>	?										-			
	<b>Indonesia</b>										-			
	<b>Timor Leste</b>										-			
<b>Other operating costs</b>											-			
	<b>Indonesia</b>										-			
	Project Coordinator - BAPPENAS										-		45,000	BAPPENAS

	Project Coordinator - MMAF										-		45,000	MM AF
	Finance and Admin support - BAPPE NAS										-		15,000	BAP PEN AS
	Finance and Admin support - MMAF										-		15,000	MM AF
	Communi- cation s - BAPPE NAS										-		3,000	BAP PEN AS
	Communi- cation s - MMAF										-		3,000	MM AF
	<b>Timor- Leste</b>													
	Project Coordinator (TI M)										-		60,000	MA F
	Finance & admin support (TIM)										-		20,000	MA F
	Communi- cation s, report preparat ion and PMU travel (TIM)										-		4,000	MA F
											-			
	Totals	500,000	70,000	1,900,000	40,150	859,850	152,542	272,000	110,000	235,000	4,139,542	100,000	210,000	4,449,542

	Co mpo nents 1-5	M &E	PM C
Indonesi a Ministry for National Develop ment Plannin g - BAPPE NAS	1,10 1,89 0		63,0 00
Indonesi a Ministry of Marine Affairs and Fisherie s - MMAF	1,80 5,11 0		63,0 00
Timor- Leste Ministry of Agricult ure and Fisherie s - MAF	1,23 2,54 2		84,0 00
ADB INO and TIM		10 0,0 00	
TOTAL USD (M)	4,13 9,54 2	10 0,0 00	210, 000

#### **ANNEX F: (For NGI only) Termsheet**

Instructions. Please submit an finalized termsheet in this section. The NGI Program Call for Proposals provided a template in Annex A of the Call for Proposals that can be used by the Agency. Agencies can use their own termsheets but must add sections on Currency Risk, Co-financing Ratio and Financial Additionality as defined in the template provided in Annex A of the Call for proposals. Termsheets submitted at CEO endorsement stage should include final terms and conditions of the financing.

#### **ANNEX G: (For NGI only) Reflows**

Instructions. Please submit a reflows table as provided in Annex B of the NGI Program Call for Proposals and the Trustee excel sheet for reflows (as provided by the Secretariat or the Trustee) in the Document Section of the CEO endorsement. The Agencies is

required to quantify any expected financial return/gains/interests earned on non-grant instruments that will be transferred to the GEF Trust Fund as noted in the Guidelines on the Project and Program Cycle Policy. Partner Agencies will be required to comply with the reflows procedures established in their respective Financial Procedures Agreement with the GEF Trustee. Agencies are welcomed to provide assumptions that explain expected financial reflow schedules.

**ANNEX H: (For NGI only) Agency Capacity to generate reflows**

Instructions. The GEF Agency submitting the CEO endorsement request is required to respond to any questions raised as part of the PIF review process that required clarifications on the Agency Capacity to manage reflows. This Annex seeks to demonstrate Agencies' capacity and eligibility to administer NGI resources as established in the Guidelines on the Project and Program Cycle Policy, GEF/C.52/Inf.06/Rev.01, June 9, 2017 (Annex 5).