

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

### 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)**

**Executing Partner Type**

Ministry of Marine Affairs and Fisheries (MMAF) and Ministry of National  
Development Planning (BAPPENAS) in Indonesia, Ministry of Agriculture and  
Fisheries (MAF) Timor-Leste Government

**GEF Focal Area**

International Waters

**Taxonomy**

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

**Rio Markers**

**Climate Change Mitigation**

Climate Change Mitigation 1

**Climate Change Adaptation**

Climate Change Adaptation 1

**Duration**

60 In Months

**Agency Fee(\$)**

400,458.00

**Submission Date**

9/15/2021

A. Indicative Focal/Non-Focal Area Elements

Programming Directions	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
IW-1-1	GET	1,334,862.00	24,500,000.00
IW-1-2	GET	3,114,680.00	100,000,000.00
	<b>Total Project Cost (\$)</b>	<b>4,449,542.00</b>	<b>124,500,000.00</b>

## B. Indicative Project description summary

### Project Objective

To alter the trajectory towards more sustainable and conversion-free aquaculture production within the Indonesia Seas Large Marine Ecosystem (ISLME)

Project Component	Financing Type	Project Outcomes	Project Outputs	Trust Fund	GEF Amount(\$)	Co-Fin Amount(\$)
Component 1: National strategies	Technical Assistance	Outcome 1.1: Development and implementation of national strategies for priority commodities.  (Indonesia and Timor-Leste)	<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.  (Indonesia)</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>	GET	570,000.00	2,800,000.00

Component 2: Shrimp feed and shrimp product connectivity	Investment	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>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 pilot validation exercises to refine and improve feed to shrimp tracking system supported (Indonesia)</p>	GET	1,900,000.00	85,625,000.00
---	------------	--	--	-----	--------------	---------------

Component 3: Amplification of seaweed aquaculture	Investment	<p>Outcome 3.1: Seaweed aquaculture and capture of nutrients from the ocean expanded (Timor-Leste)</p> <p>Outcome 3.2: Pilot site for improved post-harvest handling and processing/storage systems to meet market demand created (Timor-Leste)</p>	<p>3.1.1. Quantification of ecosystem services through methodologies developed by the GEF 7 Blue Horizons seaweed project and adopted in Timor-Leste to facilitate new approaches to quantifying and compensating for ecosystem services.</p> <p>3.1.2: Workshops conducted to develop/implement 1.2.1 and 3.1.1, including:</p> <p>National Inter-Ministerial Committees (NICs) with high level representation across key ministries,</p> <p>Involvement of relevant private sector players, including seaweed industry actors; and</p> <p>Enable / strengthen a seaweed association</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, carrying capacity.</p> <p>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)</p>	GET	900,000.00	13,750,000.00
Component 4: Downstream	Technical Assistance	Outcome 4.1: Timor-Leste seaweed sector engaged / aligned with	4.1.1: Hosting of pre- and post-project inspection by Safe Seaweed Coalition to support national targets for seaweed	GET	424,542.00	15,000,000.00

m market  
specificatio  
n adoption

the Safe Seaweed  
Coalition

Outcome 4.2:  
Engagement of  
Indonesian shrimp  
industry  
leadership/associatio  
ns with the Seafood  
Task Force

aquaculture in Timor-Leste

4.1.2: Demonstrated implementation of  
better management practices and higher  
quality control, and association of  
seaweed aquaculture supply chain actors  
in Timor-Leste

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)

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)

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)

4.2.2: Feed/shrimp tracking program  
action plan communicated / socialized  
and implemented at project sites  
(Indonesia)

4.2.3: Supply chain renovations of shrimp  
traceability, brood stock 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)

---

---

Component 5: Knowledge Management, M&E, and IW Learn (regional)	Technical Assistance	Outcome 5.1: Full participation in IW:LEARN and knowledge management/communication	<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 PEMSEA EAS Congress (Indonesia and Timor-Leste)</p> <p>5.1.2 Sharing of good practice across GEF-supported LME / regional seas programmes 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</p> <p>5.1.3 Knowledge management and communications products, such as,</p> <p>a. Lessons on improved quality specifications, 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 inclusion of improved tracking of feed through shrimp aquaculture supply chains</p>	GET	395,000.00	1,200,000.00
Monitoring and Evaluation		Monitoring and evaluation informs project management.	Adaptive management guided by mid-term review and terminal evaluation conducted to feed into future investment considerations in-country as well as within GEF.	GET	50,000.00	
<b>Sub Total (\$)</b>					<b>4,239,542.00</b>	<b>118,375,000.00</b>

**Project Management Cost (PMC)**

---

	GET	210,000.00	6,125,000.00
	<b>Sub Total(\$)</b>	<b>210,000.00</b>	<b>6,125,000.00</b>
	<b>Total Project Cost(\$)</b>	<b>4,449,542.00</b>	<b>124,500,000.00</b>

---

### C. Indicative sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount(\$)
GEF Agency	ADB	Loans	Investment mobilized	93,000,000.00
GEF Agency	ADB	Loans	Investment mobilized	31,500,000.00
<b>Total Project Cost(\$)</b>				<b>124,500,000.00</b>

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

Investment mobilized has been through the ADB Country Partnership Strategy (CPS) and Country Operations Business Plan (COBP) processes in Indonesia and Timor-Leste. Both the referenced loans are in the respective country pipelines and under preparation. 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 development of a modern brood stock centre, and 2 multiplication centres, laboratory facilities in 6 locations, regulatory analysis, and facilitation of private sector linkages in brood stock, 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 areas currently degraded or abandoned, will be restored. It will finance 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 will serve as demonstration models for farmers to replicate. As this cluster approach requires farmers to consolidate their land, the project will support establishment of farmer-based enterprises. Technical support packages will be provided to farmers to follow the sylvo-aquaculture approach of sparing land outside ponds for mangrove rehabilitation. 3. Shrimp aquaculture value chain strengthened. This output will support farmers to adopt technology for improved quality and productivity, including capacity in brood stock management, disease management, and food safety. Towards improved transparency of the sector, the project will facilitate registration of brood stock and feed suppliers, farmers, aggregators, and processors into the INDOGAP system. It will train these players in adopting 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. 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). The GEF project will be 'nested' within the above-referenced loan project. Shrimp feed value chain would constitute one (albeit significant) component of a larger, more complex value chain. GEF work will complement that of the loan, 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: "Agriculture Improvement and Water Harvesting 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 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 reservoir 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 farm land 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 which focusses 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, with a strong focus on post-harvest and upmarket support. This aligns with the general objectives of the loan.

D. Indicative 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	GET	Regional	International Waters	International Waters	4,449,542	400,458	4,850,000.00
<b>Total GEF Resources(\$)</b>					<b>4,449,542.00</b>	<b>400,458.00</b>	<b>4,850,000.00</b>

E. Project Preparation Grant (PPG)

PPG Required **true**

PPG Amount (\$)

137,615

PPG Agency Fee (\$)

12,385

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
ADB	GET	Regional	International Waters	International Waters	137,615	12,385	<b>150,000.00</b>
<b>Total Project Costs(\$)</b>					<b>137,615.00</b>	<b>12,385.00</b>	<b>150,000.00</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			
--------	--	--	--

Indicator 5.1 Number of fisheries that meet national or international third party certification that incorporates biodiversity considerations

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

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 Number of Large Marine Ecosystems (LMEs) with reduced pollutions and hypoxia**

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

LME at PIF	LME at CEO Endorsement	LME at MTR	LME at TE
------------	------------------------	------------	-----------

**Indicator 5.3 Amount of Marine Litter Avoided**

Metric Tons (expected at PIF)	Metric Tons (expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (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	0	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			
Expected metric tons of CO <sub>2</sub> e (indirect)	0			
Anticipated start year of accounting	2024			
Duration of accounting	5			

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)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)				

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 8 Globally over-exploited fisheries moved to more sustainable levels

Metric Tons (Expected at PIF)	Metric Tons (Expected at CEO Endorsement)	Metric Tons (Achieved at MTR)	Metric Tons (Achieved at TE)
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 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

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

## 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 marine aquaculture product produced globally. Approximately 90% of shrimp and 99.5% of seaweed are produced in Asia[1]. Shrimp and seaweed, together, embody the best and worst of aquaculture, in that the positive benefits of seaweed far outweigh any negative impacts from its production, whereas farmed shrimp has a large environmental footprint but with great value for farmers and supply chain actors. One other clear difference between shrimp and seaweed is that shrimp is 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 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 horticulture 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 but 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 resultant supply chains is stark. As stark, is the damage that shrimp aquaculture has had on coastal environments in the tropics. Habitat degradation of coastal wetlands, nutrient pollution of coastal waters, bycatch of ocean species during 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.[2] 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, there is one facet of aquaculture and more specifically shrimp aquaculture that has created harm with no accountability – 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 with it liabilities of environmental harm, food safety and labour and human rights abuse. Feed ingredients used by feed mills are kept secret because the manufacturers claim intellectual property of the feed formula. The reality is that no oversight is present for 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/or food service companies that buy their products that their feed was used to grow. The shrimp supply chain is riddled with fraud and corruption that includes the 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 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 greater indiscriminate catch of marine organisms.

Seaweed is the largest form of marine aquaculture representing over half of all production in the marine environment. Seaweed does not require freshwater or feed inputs, chemicals and therapeutants, land conversion or fertilizer. Seaweed grows in waters through absorption of nutrients coupled with photosynthesis. The net result of seaweed aquaculture is extraction of carbon dioxide (reducing acidity), nitrogen and phosphorus from the ocean and an algal protein that produces dissolved oxygen in 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.

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, and while seaweed may provide more positive attributes, shrimp is more valuable and is a large portion of global aquaculture, currently. 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 market forces of the Seafood Task Force (STF) and the Safe Seaweed Coalition to bring leverage and current market demands to the project to demonstrate the need for better feeds in shrimp and the need for better product quality in cultivated seaweed. 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 causes:***

The literal erosion of the ocean’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 decay of organic matter, suspended solids reduce sunlight penetration and photosynthesis, and rising temperature accelerates all the kinetics of these processes. In addition, humans are removing habitat and marine species for consumption and ingredients in feed. The environmental stressors of a compromised marine ecosystem coupled with the over-exploitation of fisheries with little to no accountability creates 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.

The true potential for unlocking the “seaweed solution” for the ocean lies in market diversification and increases in 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 specification. The poor quality of product 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 behoves us to engage and solve for the loss of seaweed aquaculture livelihoods.

Shrimp farming is a lucrative business. In Asia, a shrimp farmer can lose 2 out of 3 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 small-holders 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 small-holder 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 leverage to make requests of feed companies and as farmers are the only users of the feed, there are no other mechanisms to foster greater accountability in the feed supply chains. The result of this lack of accountability is over-fishing and IUU continue and increase, and habitat conversion goes 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 less 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<sup>[3]</sup> that have, in some cases, masked the true activities that occur in shrimp supply chains<sup>[4]</sup>. 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 reports came out, the feed mills maintained their certification during the crisis, and they retain the certification currently. 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.

***Barriers to scaling shrimp feed accountability and seaweed aquaculture include the following:***

While the shrimp industry has seen some professionalization in terms of increased intensity and larger investments, most shrimp farmers are still small-scale and disconnected from major components of the supply chain. The barriers to greater feed accountability rest in government policy and oversight as well as supply chain organization and transparency and market pressures. The benefit of having the ADB co-financing loan in the proposed project presents an opportunity for greater 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.

The seaweed industry is also disaggregated, but the challenges that result from this fragmentation rest largely on the inability to demonstrate and share knowledge on better post-harvest handling of seaweeds and farmers beholden to the traders that purchase 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.

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 of farmed shrimp requires sorting of sizes and sorting of 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 product 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 BAP certification in Thailand that 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 stringent policy is developed and enforced and the right international market actors that want to know the truth are engaged.

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

To reiterate, this project would not be undertaken without the significant loan being put in place in Indonesia which will have many touch points and leverage opportunities on different supply chain actors. However, it should not be dismissed that organizing the shrimp value chain in Indonesia – even a portion of it – will be an incredibly challenging task, but the various aspects of what others institutions are doing now, the GEF opportunity and the ADB loan creates a scenario in which multiple, large forces could converge to create a window of opportunity.

The farmers are not aware of market demands. The middlemen shield farmers from knowledge about markets and pricing. The current system works best for the middlemen, and they 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.

***Seaweed-Timor-Leste: Limited post-harvest handling capacity and knowledge sharing of better post-harvest and pre-processing techniques that garner greater value in seaweed supply chains:***

Most seaweed farming interventions focus on teaching farmers how to grow seaweed as that is generally where aquaculture expertise is found. The post-harvest and handling advice for seaweed is provided by middlemen who can use the perception of poor quality as a bargaining tool. Whether it is perception or reality of seaweed being of poor quality, farmers are not informed as to “what is good quality” and “what is bad quality”. This lack of knowledge detracts from their bargaining power and can lead to the departure of seaweed aquaculture as a livelihood. The lack of standard operating procedures and metrics guiding seaweed farming can disincentivize greater seaweed aquaculture growth. In order to increase scale of production, the quality of seaweed biomass needs to be standardized (in terms of food safety, environmental standards, etc) and agreed to by actors along the value chain. Linking good practices for seaweed farming and processing, and harmonizing global seaweed demand with regional and national seaweed farming, is vital for growth of the sector. This does not require certification, per se, but rather national strategies and guidelines that are aligned with international market specifications.

### ***Seaweed – Timor-Leste: Barriers related to development plans to promote seaweed value chains***

The growth of seaweed farming is constrained primarily by lack of proper marine spatial plans and operationalization of these plans. The current industry in the tropics is based on inshore and intertidal areas where multiple conflicting users vie for space (tourism, shipping, animal aquaculture, fishing, energy production, etc.). To ensure a national enabling environment for seaweed farming in Timor-Leste, coordination is needed among various actors including government agencies, seaweed associations, seaweed clubs, and the private sector where applicable – for the creation of seaweed development plans and Marine Spatial Plans. For seaweed development plans, the links to regional and global value chain market forces must be considered. Such plans rely on buy-in from multiple government agencies and seaweed growers, thus a national strategy would help align these efforts.

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, but lessons from other nations indicate that zoning for aquaculture should provide ample “relief” area for boat travel from shore to fishing grounds and to 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 the ability to manage more daily maintenance activities because of distance to shore, storms, dynamic ocean currents, etc. All of these aspects are necessary to be included in national strategies and plans but developing a quality product that can be sold for a price that meets higher specifications is the primary factor that will afford Timor Leste with the ability to grow its seaweed aquaculture sector. Expansion plans and spatial plans will be necessary once it can be demonstrated that this level of product quality can be achieved.

### **Baseline scenario and associated baseline projects**

**Shrimp** is a popular seafood item for which there is a 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[5]. Farmed shrimp comprised 63.5% of total, global shrimp production (wild plus farmed) in 2019<sup>4</sup>. Approximately 472,000 t of freshwater shrimp were produced in 2019<sup>4</sup>. 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).

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, environmental impacts 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 that

have been sued for the liabilities in the feed ingredients supply chains. The lawsuits filed on international brands is a sign of the ineffectiveness of certification in remedying challenges in the shrimp sector more broadly, but also it highlights how difficult it can be to articulate a true depiction and understanding of shrimp aquaculture and shrimp feed supply chains.

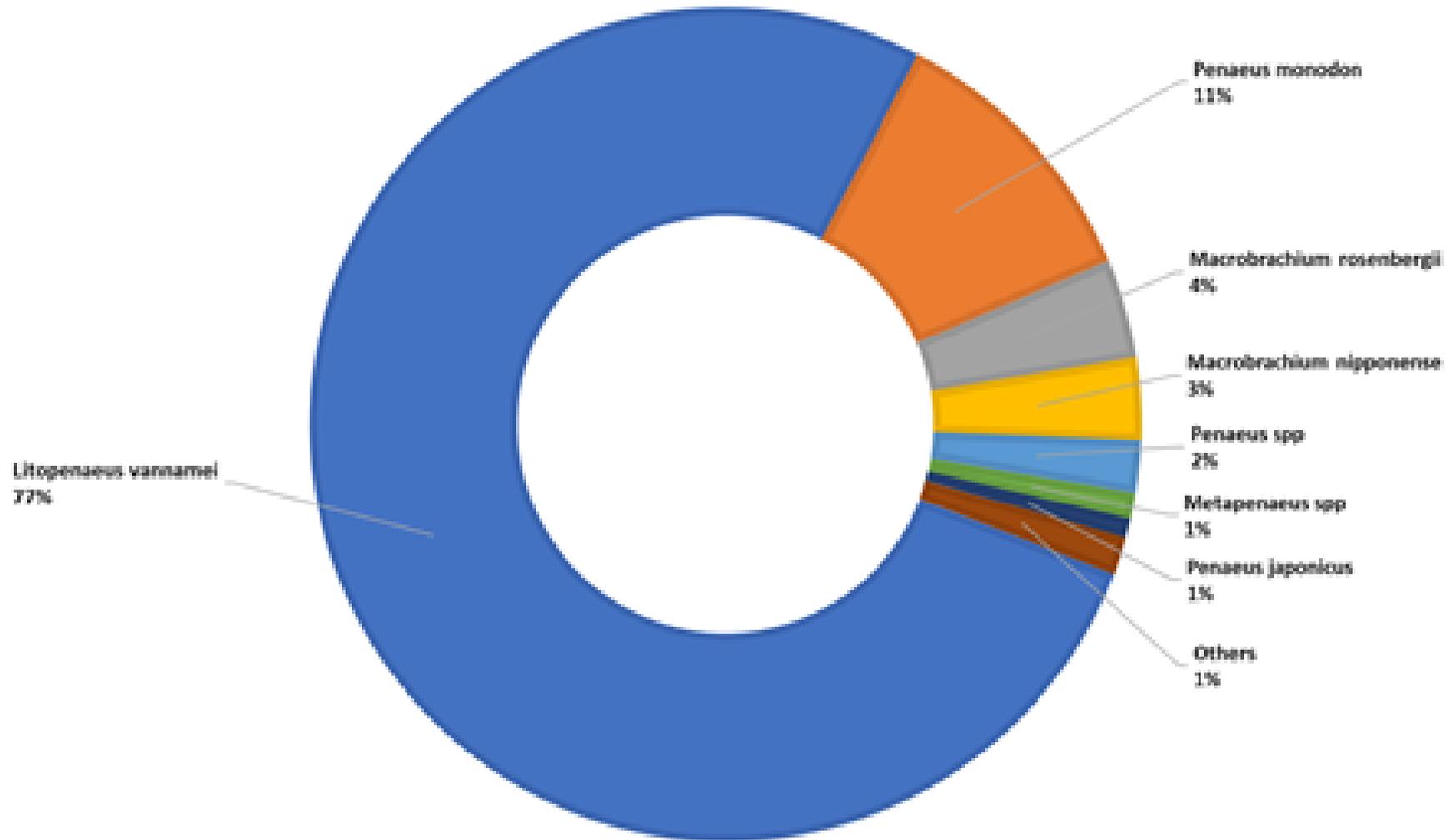


Figure 1. Global aquaculture production of shrimp, by species. "Shrimp" is defined as the taxonomical order Natantia. Source: FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021. [www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en).

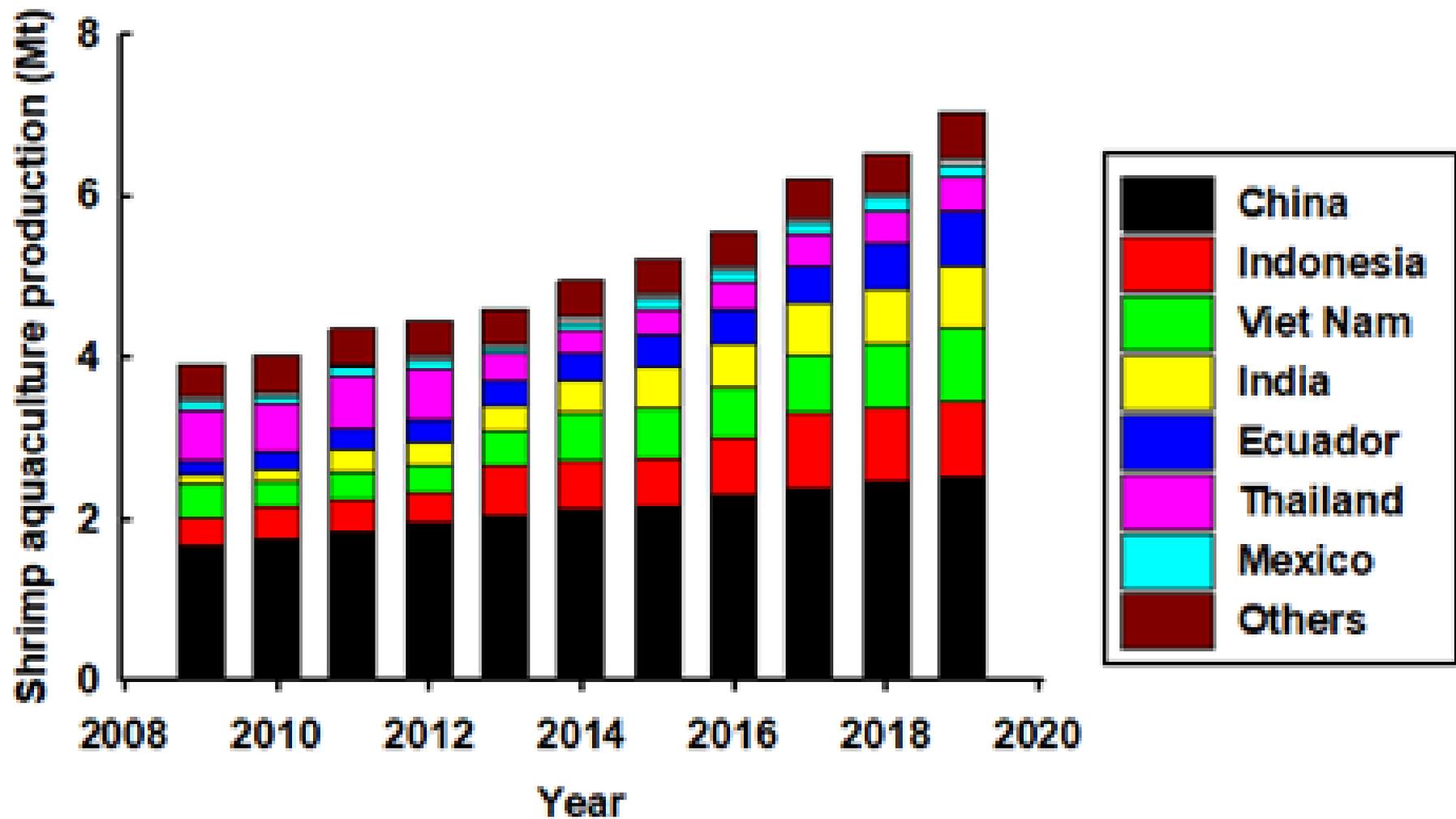


Figure 2. Global shrimp aquaculture production by top producing countries over the past 10 years. "Shrimp" is defined as the taxonomical order Natantia. Source: FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021. [www.fao.org/fishery/statistics/software/fishstatj/en](http://www.fao.org/fishery/statistics/software/fishstatj/en).

Global **seaweed aquaculture** increased by 53% from 2009 to 2019 resulting in a total annual production of seaweeds in excess of 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 overharvest of seaweed from the wild coupled with 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 industry, meat industry, and in pharmaceuticals. Asia contributes most to the production of farmed seaweed, with China, Indonesia and the Philippines representing the top seaweed producing countries by volume (Fig. 4).

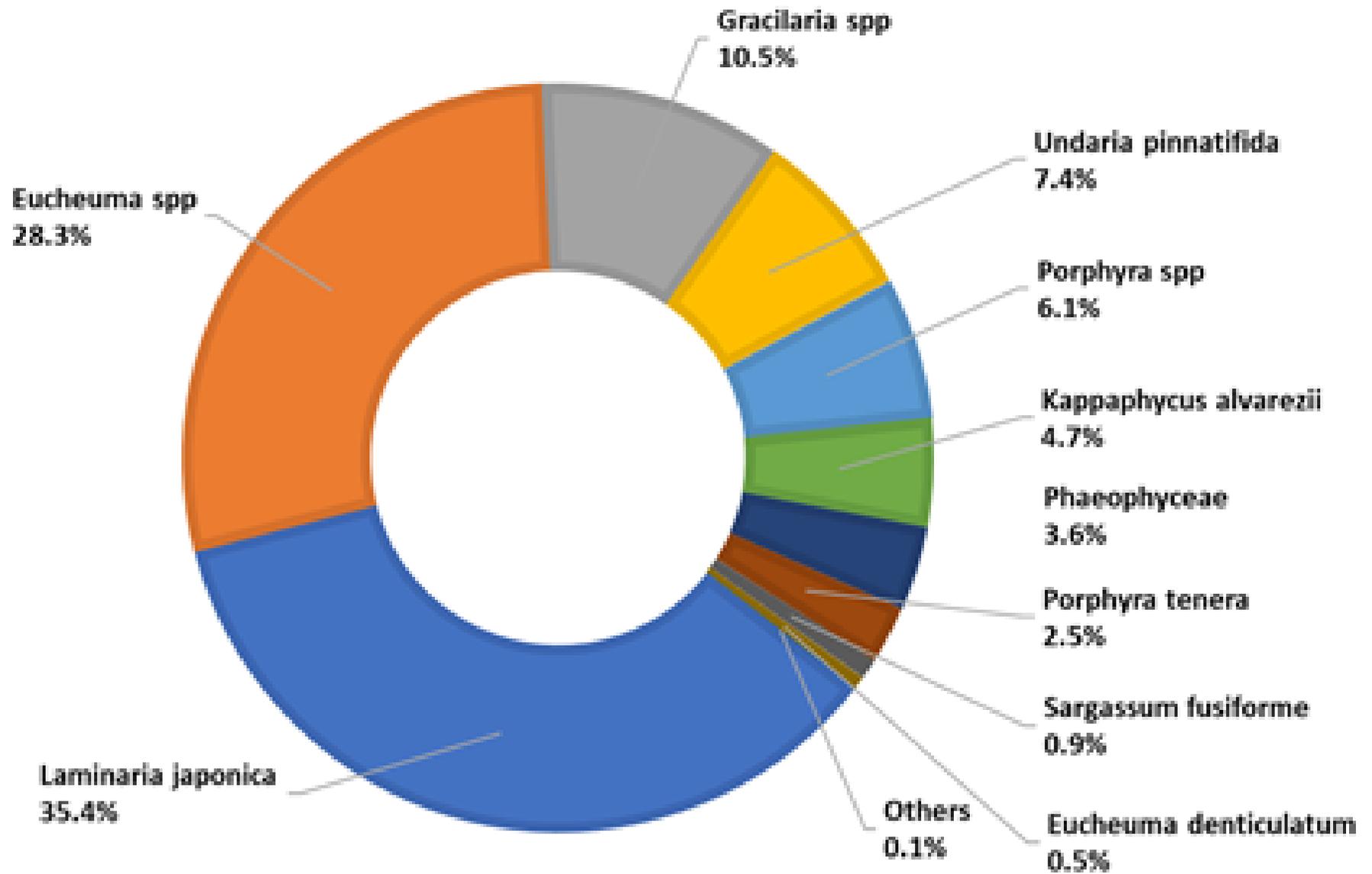


Figure 3. Global aquaculture production of seaweed, by species. "Seaweed" is defined as the taxonomical orders of Chlorophyceae (green seaweed), Phaeophyceae (brown seaweeds) and Rhodophyceae (red seaweeds). Source: FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (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)

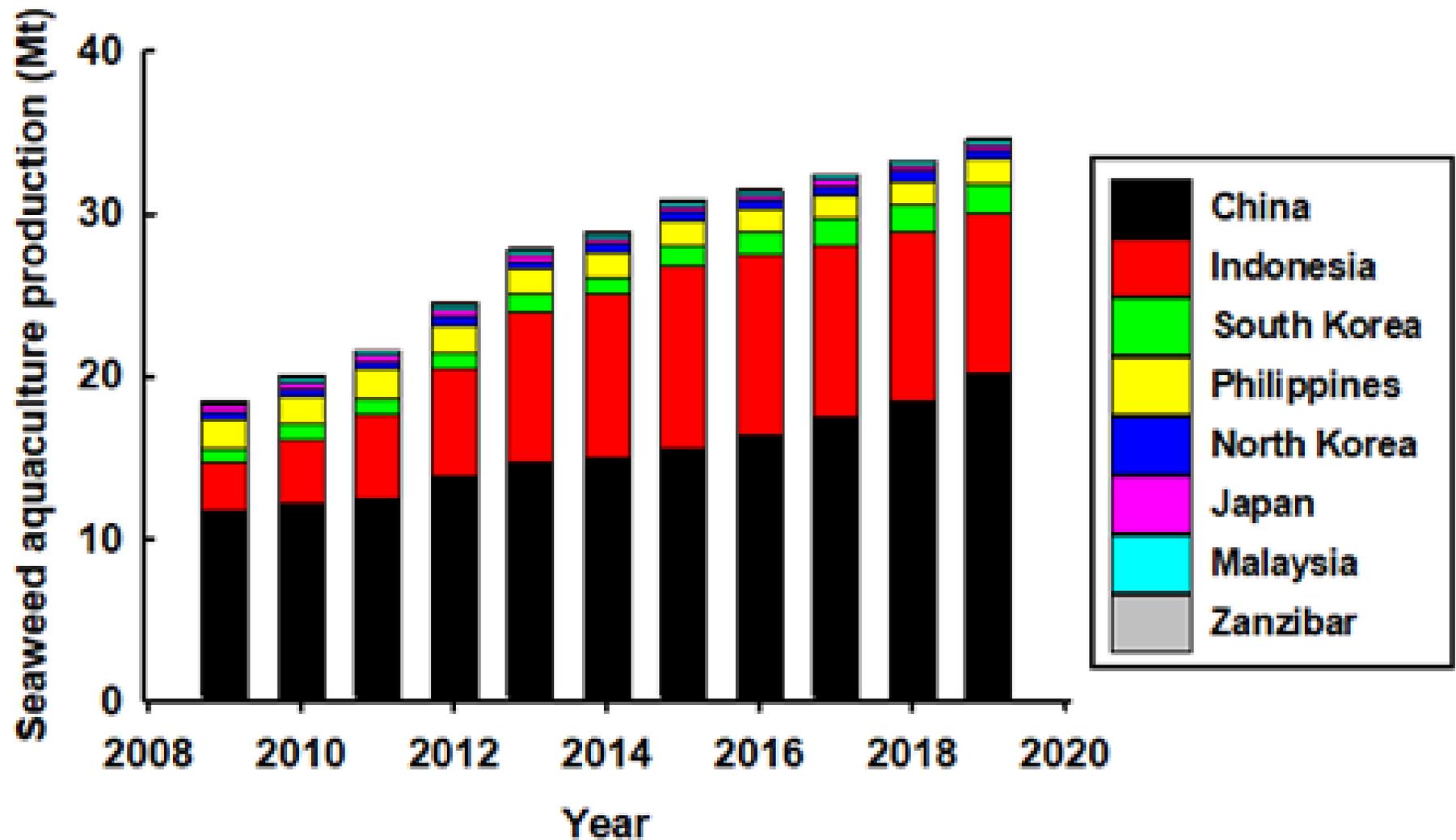


Figure 4. Global seaweed aquaculture production by top producing countries over the past 10 years. "Seaweed" is defined as the taxonomical orders of Chlorophyceae (green seaweed), Phaeophyceae (brown seaweeds) and Rhodophyceae (red seaweeds) Source: FAO. 2021. Fishery and Aquaculture Statistics. Global 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).

The culture of shrimp 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 major component of Asian and SE Asian economies. The challenges that exist in the shrimp aquaculture sector must be addressed to create a more sustainable food commodity but also to bring impacts down to a more tolerable range to maintain support for an industry that has an extremely large livelihoods footprint.

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 livelihoods generation as well as a food produced with environmentally beneficial attributes both at the local scale but also 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.*

***Global and regional baseline plans and activities:***

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 more than 3 billion people and livelihoods for more than 800 million around the world. The United Nations Food Systems Summit (UNFSS) is making the case for the integration of Blue Food into the broader food system framework. At a regional and national level this integration may be more common, 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% located within the territorial waters of Timor-Leste. Within the ISLME, 1.49% of the area is officially protected, and the area contains 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.

The following demonstrate the institutions and areas of overlap and synergy where engagement will be critical for success:

-

The Seafood Task Force (STF) is a private sector, 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 government 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 behaviour change of consumers and corporates in Europe based on an increased awareness and knowledge of the implications of seafood consumption and sourcing on people and oceans in the developing countries, but also in Europe.

-

The Conservation Markets Initiative is a large scale, Gordon and Betty Moore Foundation-funded project to eliminate 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 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 for better informing 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.

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 blue economy (including fisheries and aquaculture, tourism, marine renewables).

Numerous seaweed livelihoods 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 chemical extraction of seaweed.

### ***Indonesia baseline plans and activities:***

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. The 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 has a focus on reduction of capital expenditures, thus large ponds with low stocking density fed by the tidal prism which flushes water in and out of tambaks. The introduction of 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 feeds 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 is 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 resembles 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.

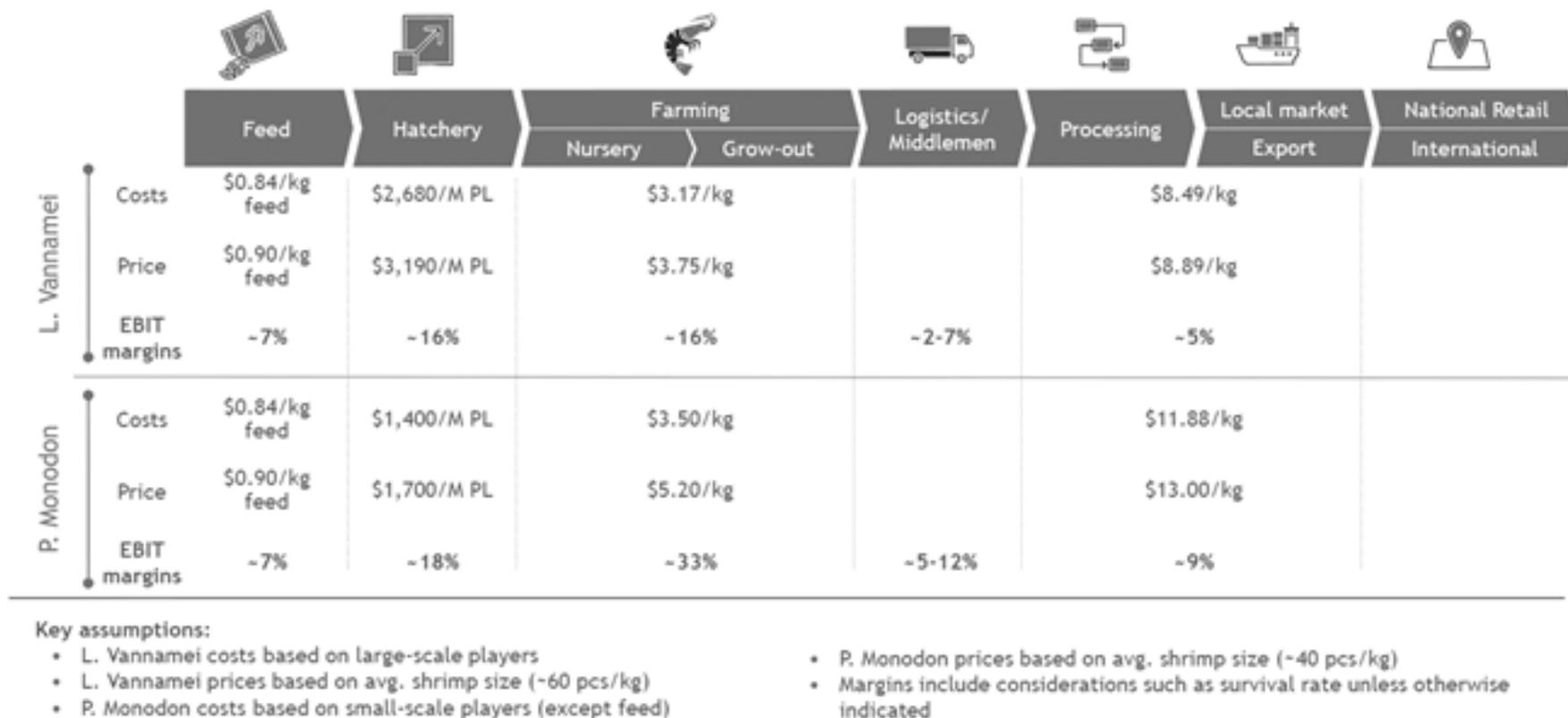


Figure 5. Overview of costs, sales price and EBIT margin across value chain. Source: Boston Consulting Group.

The ISLME is under pressure from IUU fishing including significant transboundary fishing which the MMAF estimates to be a USD 20 billion per year loss.<sup>[6]</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. 6). 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 markets 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.

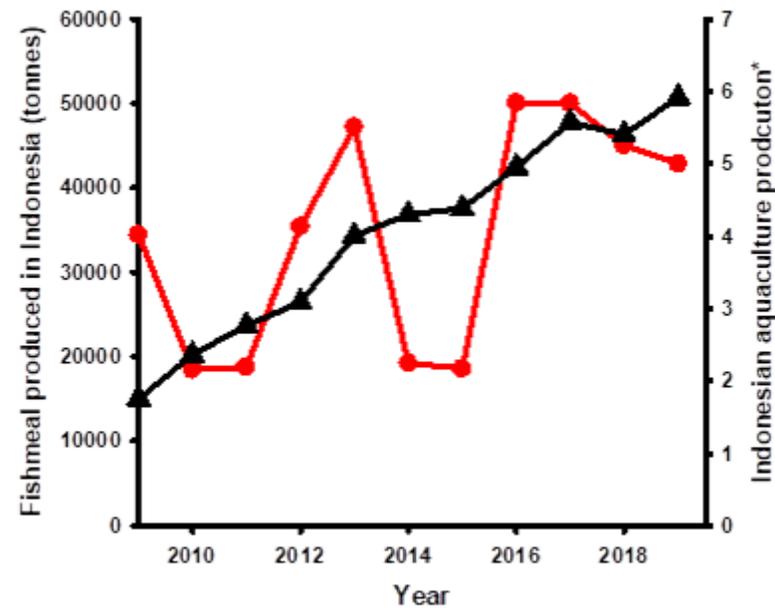


Figure 6. Fishmeal and aquaculture production in Indonesia. FAO. 2021. Fishery and Aquaculture Statistics. Global aquaculture production 1950-2019 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2021.

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

\*Excludes aquatic plants and molluscs.

The two most current pieces of Indonesian legislation on aquaculture feed are (1) 55/PERMEN-KP/2018 and (2) 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 is label requirement 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 record or the Seafood Import Monitoring Program (SIMP) to prevent IUU Fishing and Seafood Fraud, 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 plans and activities:*

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 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 nascent stages of development, and as such it will be important to build on work done to date and align with 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 – “Agriculture Value Chain and Water Harvesting 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:

11. Identification of suitable agro-ecological zones for aquaculture development completed
- 2.. Viable aquaculture technologies developed and disseminated
- 3.. Institutional capacity of the NDFA strengthened
4. Sustainable input supply systems established
- 5.. Aquaculture producers connected to markets
6. Household food and nutrition security improved by aquaculture
- 7.. Effective partnerships between government agencies, NGOs, communities, the private sector and donors created
8. Aquaculture farmer groups and representative institutions empowered, and
- 9.. Favourable policies in place for environmentally responsible aquaculture development.

One of the targets in 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.

### **Proposed alternative scenario**

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 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 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 direction for the future of shrimp farming in Indonesia and the future of seaweed farming in Timor-Leste.

### Mitigation of IUU and Over-fishing 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 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 Loan - Indonesia: Development of a traceability system for farmed shrimp – in accordance with the trending market demands, the ADB loan to Indonesia will require traceability and transparency in the shrimp supply chain. This work will assist the GEF components because the origin of the shrimp and the purchaser of shrimp feed will be identified.

-

Proposed GEF Project – Indonesia: Create feed to shrimp tracking system modelled 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 would serve as a fundamental component that will have the flexibility to track feed.

-

Proposed GEF Project – Indonesia: Once electronic traceability to farms can be implemented, the feed companies and brokers can be engaged to provide greater insight into the sources of their raw materials. A supply chain analysis of Indonesian'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 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 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 – Private Sector: The STF is in a position where it would move more quickly into Indonesia and provide greater retail and food service leverage if the enabling conditions were appropriate. The development of a shrimp traceability tool and the development of feed to shrimp tracker would be ample evidence of these positive conditions. With retail and food service pressure, the shrimp processors will have to collaborate and organize with each other to create the system that is demanded by buyers and investors.

It is not often that multiple efforts and projects line up in such a synergistic way to foster great change. Moreover, these changes will take years and the investments by all change agents described above have a minimum of 3-5 years of working capital to realize the theory of change (see below).

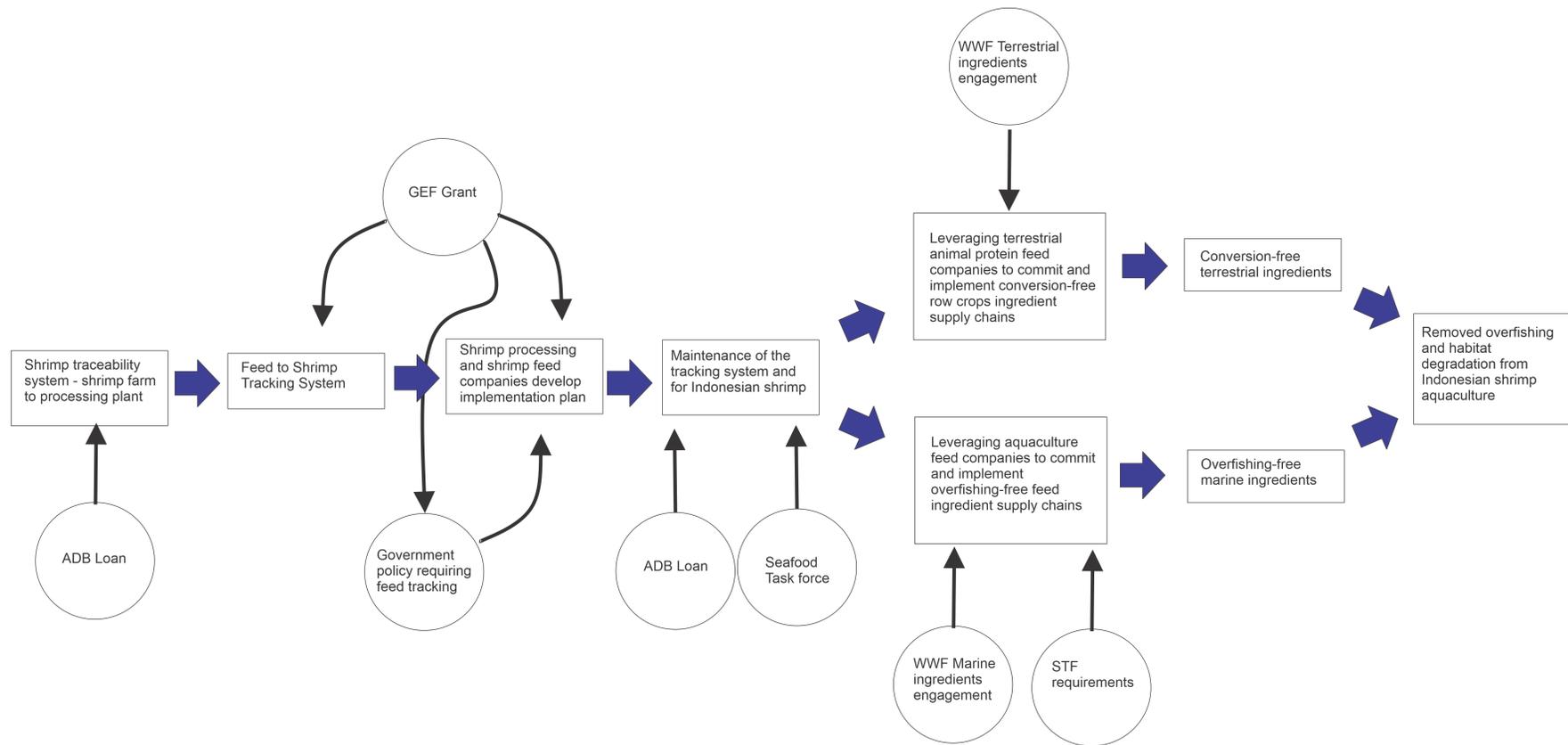


Figure 7: Theory of Change (Indonesia intervention) - The interactions and interdependencies of multiple institutions with leverage in different parts of the feed supply chains are currently active and represents an opportune moment for the implementation of this theory of change to be implemented in Indonesia.

Fundamentally, the GEF's contribution to halting conversion and over-fishing 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 because of significant support from the private sector, lending, NGOs and pre-competitive platforms.

### Increasing Post-harvest Capabilities to Enhance Seaweed Aquaculture Livelihoods in Timor-Leste

#### *The Seaweed Solution*

The so-called *Seaweed Solution* is only as good as the market(s) seaweed farmers can access. It is critical to enhance farm value to maintain farmers in the supply chain. If livelihoods are not successful, the ecosystem services of seaweed aquaculture are lost. Thus, post-harvest handling, value addition and knowledge sharing are the main components of the Timor-Leste portion of the project.

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 generating better marketing conditions. These conditions will be improved through actions described below.

Improved post-harvest handling will be facilitated by setting up a centre of excellence for post-harvest handling of seaweed in or around Dili district. The likelihood is that facilities that currently have post-harvesting capabilities will be enhanced with seaweed post-harvest capabilities. There will be a host of solutions developed and demonstrated to be employed in remote settings with solar power such as portable dehydrators, mini cool-cold storage facilities, first stage extractors, etc.

The National Aquaculture Development Strategy for Timor-Leste identifies the development of farmer groups or associations as a key output. Generating cooperatives or associations is critical when supply chains are elongated because the bargaining power in these circumstances is pooled volume sales. When post-harvest quality is increased and storage capabilities are present, the bargaining power is increased as well, but to be effective in disseminating the knowledge to have consistency in the pooled volume, collective action and associations are needed. The efforts in Timor-Leste in this project will be to empower and enhance existing cooperatives to equip them with the right knowledge and technologies to not be beholden to traders and middlemen for information. Additionally, organized farmer cooperatives allow for demonstrations of alternative uses for seaweed and opportunities for diversification.

With a national strategy in place, a centre of excellence for post-harvest handling and technologies developed, the project will shift towards better marketing and connectivity with international markets themselves. Because seaweed is supported broadly as beneficial activity, if sited 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. This will also lead to greater international market awareness. It is intended as well to seek engagement in the Safe Seaweed Coalition which is part of the largest and diverse set of actors with a focus on global seaweed sustainability and expansion. 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.

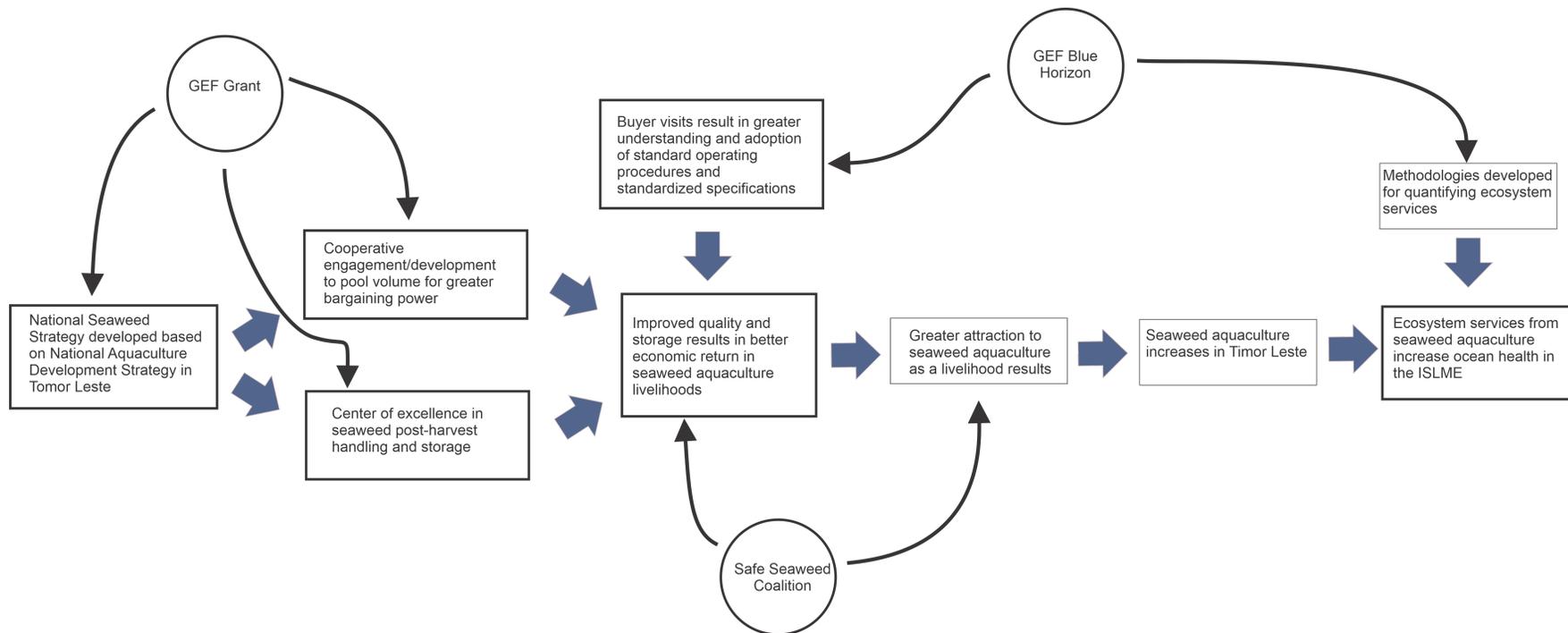


Figure 8: Theory of Change (Timor-Leste intervention): The interactions multiple GEF projects with leverage from international demand provides the theory of change to be implemented in Timor-Leste.

The project 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 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.*

Some elements of the national action plans would include:

*Mapping of Land requisition requirement to determine 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 product 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 product for any interventions into farming practices and time to processing.

*Development of national seed program to improve the quality and availability of seeds to support national demand (Indonesia).*

The failures of shrimp farming result in less capital to invest in better seed and thus, more diseased seed and suboptimal seed is used. Renovating hatcheries with better broodstock and more widespread distribution of healthier seed will result in better biosecurity and disease management.

*Building climate mitigation and resilience into national action plans*

Shrimp farming has historically been associated with clearing of mangroves, a practice which 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 ecosystems benefits, but also rehabilitate abandoned ponds. It will further review actions which can be designed to promote resiliency 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 would include such areas as the development of quality seed, quality control, monitoring and testing facilities, alternative sources of protein for fishmeal, etc. A "R&D Agenda" could also explore private sector engagement to undertake "pre-competitive research". This could include a multi-stakeholder panel to refine a key aspect of which will be financial modelling and comparative analysis of current fishmeal practices vs alternatives.

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

The importance of stakeholder input to develop balanced policy approaches that allow business to remain viable while appropriate safeguards and regulations are put in place to provide the government of Indonesia to have a 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.

Overall the Indonesia national aquaculture strategies and action plans would signify the mandate that these efforts that follow are supported by the respective government authority.

*Output 1.1.2: Marketing and business plan for renovated shrimp sector for greater magnitude of market reach developed*

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 should be targeted and thus, attention to the reasons why (political, revenue, security) certain markets are targeted over others should be considered. This strategy should 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 should 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 would be articulated by the improved economic and sustainability aspects that are realized in the business plan implementation.

*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). Components of the National Seaweed Strategy include:*

Planning for the expansion of seaweed aquaculture will require national attention to the direction of industry travel, uptake of new livelihoods and the extension support that should be allocated for a vibrant seaweed aquaculture sector. This strategy will provide the government mandate that affords greater support to the expansion of the seaweed aquaculture industry in Timor-Leste. The seaweed strategy will also serve as an advertisement for buyers that seek new product sources. By articulating the strategy for seaweed in Timor Leste, an inherent public relations benefit is present and the attributes of that strategy function as the promise to the buyer as to how the industry is intended to grow.

*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.

*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 should 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 clear targeted markets is critical. Market targeting is one of the most important aspect of strategic business planning. All markets cannot be targeted. Resources for specific market and business planning, if invested correctly and followed, pays dividends when strategy review takes place.

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

As with any living organism, diseases can have 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, 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*

Fishermen 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 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 should 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 should 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.

*Output 1.2.1: Timor-Leste - 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*

Planning for the expansion of seaweed aquaculture will require national attention to the direction of industry, uptake of new livelihoods and the extension support that should be allocated for a vibrant seaweed aquaculture sector. This 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 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 should 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 shift might draw capacity from other sectors and these implications will be considered.

**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 product to satisfy growing international market demand (Indonesia) (\$ 1,900,000)***

For 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 product will require greater depth of knowledge of the feed ingredients being used and their origins. This outcome is to enable that information to become more transparent. 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 vetted through the Seafood Task Force for credibility purposes and also so that it meets the desires of the buying community.

***Output 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)***

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 has a mandate to expand their work to Indonesia because their collective purchasing represents the bulk of 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 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 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 serve to demonstrate the scale of this challenge.

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

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 feed will assist in minimizing fraud. These mass balance validation exercises will be built off the mass balance protocol of the STF but tailored to the Indonesia local conditions. This protocol will be used in workshops convened with government and the Indonesian feed sector to identify challenges and work to overcome them.

***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 roadmap and execution timeline – with links to National Action Plans for Shrimp Aquaculture (Indonesia)***

Shrimp feed action plan 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 the evidence to determine if a separate traceability system is necessary and different from the farmed shrimp traceability effort included in the ADB baseline investment. The STELINA system is under development in Indonesia, but the current status does not allow for the incorporation of feed. Through the project, the determination of what system to be used for shrimp to feed tracking will be critical.

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

Sample trace-backs will be used via the mass balance methodology to test the validity of the shrimp to feed tracking system and the controls in place to confirm feed to shrimp tracking and provides the opportunity to improve capabilities and user interface such that value is added to farming, feed manufacturing and processing. With the ADB loan facilitating large scale changes in the shrimp value chains of Indonesia, new standard operating procedures can be put in place that creates more connectivity to other nodes in the supply chain for shrimp and feed.

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

#### ***Outcome 3.1: Seaweed aquaculture and capture of nutrients from the ocean expanded (Timor-Leste)(\$ 100,000)***

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 mitigation mechanism to halt some nutrient pollution and ocean acidification that these processes are measured and tested appropriately. Expanding seaweed aquaculture is critical to realize scaled ecosystem service benefits.

*Output 3.1.1. Quantification of ecosystem services through methodologies developed by the GEF 7 Blue Horizons seaweed project and adopted in Timor-Leste to facilitate new approaches to quantifying and compensating for ecosystem services.*

Through the GEF 7 Blue Horizons seaweed project in the Philippines and Viet Nam, methodologies for ecosystem service quantification will be developed and the cross-fertilization of GEF projects will result in more uniform measurements of ecosystem services such that gross impact of seaweed aquaculture can be articulated for large development projects utilizing seaweed aquaculture as livelihoods alternatives. One of the co-financing organizations in the Blue Horizons project focuses on better carbon pricing which would inform innovative mechanisms for better valuation and cost sharing for ecosystem services. This will be explored as part of the collaboration.

*Output 3.1.2: Workshops conducted to develop/implement 1.2.1 and 3.1.1, including:i) National Inter-Ministerial Committees (NICs) with high level representation across key ministries, ii)Involvement of relevant private sector players, including seaweed industry actors; and iii ) Enable / strengthen a seaweed association*

The implementation of national strategies and the understanding of ecosystem services will require workshops that include multiple ministries across the environment, industry and human well-being. These workshops will 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.

*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. Because the Blue Horizon project is addressing near shore and non-near shore environments the policy and regulatory gap framework will be comprehensive and should serve to 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 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.

#### ***Outcome 3.2: Pilot site for improved post- harvest handling and processing/storage systems to meet market demand created (\$ 800,000)***

A hub or centre of excellence will be developed for the country of Timor-Leste for seaweed aquaculture post-harvest handling and storage. This site will have technological advances that provide better opportunities for greater quality of seaweed produced and will also service as areas of gathering for association/cooperative meetings and planning.

*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)*

A seaweed post-harvest centre of excellence will be located in Dili and will make use of processing facilities for fish and shrimp that can be retooled for seaweed processing. Additionally, localized kits for better pre-processing of seaweed will be made available for use while also providing experimental research in better ways to equip remote areas of production with cost-effective pre-processing and storage of seaweed grown by communities.

#### **Component 4: Downstream market specification adoption**

##### ***Outcome 4.1: Timor-Leste seaweed sector engaged / aligned with the Safe Seaweed Coalition (\$ 149,542)***

The Safe Seaweed Coalition is a broad body of development institutions, research institutions, multi-lateral lending, NGOs and industry to amplify seaweed aquaculture to support greater seaweed product use cases and to engage other parts and regions where seaweed is being explored as a development tool for lower impact, higher return livelihoods. The Safe Seaweed Coalition is also developing better carbon markets for which seaweed could become a greater source of carbon credits.

*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*

As the Safe Seaweed Coalition includes science and industry, it is a fitting resource for the Timor-Leste cooperatives to join. Further, the Safe Seaweed Coalition brings current market trends, private sector product specification and purchasing power to the table. In support of increasing seaweed quality in Timor-Leste, the Safe Seaweed Coalition will be engaged to make site visits and determine gaps to help the Timor-Leste seaweed aquaculture sector grow in an optimal manner.

*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*

The pre- and post- project visits of the Safe Seaweed Coalition will allow for the showcase of how better equipment and better management practices can improve seaweed quality and safety. For the Safe Seaweed Coalition to provide maximum benefit to Timor-Leste, the industry would need to demonstrate that consistent quality and consistent volumes of seaweed are available. This will also demonstrate the will of Timor-Leste to engage in international markets for seaweed.

*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)*

Through the multiple visits of the Safe Seaweed Coalition and the economic outlooks for seaweed, the need for standard operating procedures applied to all growers in a cooperative will become apparent. This need should translate into stronger collaboration amongst seaweed growers in Timor-Leste.

*Output 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)*

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 any challenges were overcome. The Blue Horizon project will bring buyers to the region for exploration in purchasing product, 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 shrimp buyers have contracts with the major processing plants in Indonesia. Amongst the various supply chain actors, the processing plants will be closest to the seafood buyers from the STF. This engagement is intended to strengthen the desire for stronger oversight to maintain and access new markets for 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. Why is it important to engage with STF? To create and strengthen conditions for improved shrimp export performance, among other things.

*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)*

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)*

The fully function feed/shrimp tracking system will become operational and supported by government policies to enhance market opportunities and to support greater environmental benefits by interventions in feed ingredient supply chains. Completed validation checks through mass balance methodology will demonstrate that the feed/shrimp tracking system is operational and prepared for wider implementation and use.

*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.*

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: Full participation in IW:LEARN and knowledge management/communication (\$ 395,000)***

To solidify lessons learned, new opportunities and how to communicate and manage such knowledge, the project participants will engage to support the external sharing of project outcomes, challenges and solutions and the overall case that interventions have positive IW environmental outcomes.

*Output 5.1.1: Participation in two IW:LEARN regional meetings and one GEF Biennial International Waters Conference (IWC) delivering IW:LEARN experience notes, and PEMSEA 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 seed new ideas and projects will help identify new solutions that would only be possible because of a shared systematic approach to identifying IW projects and delivering on environmental outcomes.

-

*Output 5.1.2 Sharing of good practice across GEF-supported LME / regional seas programmes 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*

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, piggy-backing on various international conferences etc) to share good practice on conversion-free aquaculture. Given that this will be a concern for most, if not all, of the programmes, the main aim will be to influence SAP implementation. In particular, the focus will be on the need for, and benefits derived from, similar investments across the region.

*Output 5.1.3 Knowledge management and communications products, such as: i) Lessons on improved quality specifications, private sector engagement, feasibility of carbon markets, supply demand models for different seaweed products for Timor-Leste, and ii) Lessons on aquaculture policy and strategic directions for Indonesia – with inclusion of improved tracking of feed through shrimp aquaculture supply chains, iii) Other types of technical reports and assessments*

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.

Importantly, Timor Leste has a nascent aquaculture industry and there is a significant opportunity to improve knowledge management between Timor Leste and Indonesia 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.

**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, 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 phosphorous and nitrogen capture, and (3) carbon sequestration to reduce ocean acidification.

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 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 catalysing 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 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 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.

In this reimagining 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 for more intense forms of aquaculture. But seaweed aquaculture requires knowledge enhancement for 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 the 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 in 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 would 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 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 horticulture loan from ADB. Although not the same as aquaculture, horticulture will be coupled with water harvesting techniques which 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 product that provides an ecosystem service can be achieved.

The commercial aquaculture sector can make great strides to combat conversion and deforestation as well IUU fishing and overfishing. However, these opportunities cannot be achieved one company at a time because there is a comparative advantage of not addressing these issues to obtain short-term financial reward. Whilst companies know or can be convinced to understand that eroding the resiliency of nature and biodiversity has long-term negative business outcomes, competition between companies provides the space for leakage of unsustainable products into supply chains.

One of the means to combat this leakage is with pre-competitive collaboration among companies such that fundamental protections can be put in place to protect nature and people. While these efforts from the private sector can be partially or temporarily successful, there is a fundamental requirement for strong policy and regulatory enforcement to maintain these positive gains. The GEF is strategically positioned to create this bridge between private sector initiatives and long-term policy reforms. More specifically, the GEF's position across policy and the private sector can:

1. Provide the platform for how private sector initiatives that have positive environmental and social outcomes can be codified into policy.

2. Create the cross-sector recognition that aquaculture utilizes both terrestrial and aquatic resources and habitats that require inter-agency and inter-ministerial collaboration for an ecosystem-based outcome.
3. Incentivize government to meet the industry where it is with regards to business necessity to create more effective environmental protections.
4. Influence donor countries of the GEF to create practical and incremental steps that engage businesses at a local and regional scale to create principles for short and long-term environmental protections to demonstrate the pathway towards improved outcomes rather than simply the end goal.
5. Act as a multiplier of success through the IW Learn platform to not only share the lessons of public-private sector partnerships, but how to maintain these partnerships beyond the life of grants to accumulate leverage rather than create project-level leverage that dissipates post-implementation of grants.
6. Generate a broader global platform of fundamental climate change targets that are benchmarked over time and in an additive and cumulative nature to demonstrate how GEF grants, but also other non-GEF funded projects, maintain momentum.
7. Play a larger role in utilizing public relations and communications at a global scale to demonstrate clear enabling conditions for public-private partnerships to achieve shared environmental outcomes.

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 20 metric tons (mt) of seaweed (dry weight) per year at 1-2 sites. A 10-year scaled estimate of this production in line with Timor Leste's National Aquaculture Strategy would require 100 seaweed growing sites. This would equate to roughly 30%<sup>[7]</sup> more seaweed than the baseline. Assuming an approximate rate of 10 mt of seaweed (dry weight) produced per hectare, the 20 mt sites of seaweed proposed to be produced in Timor-Leste under better post-harvest handling would equate to 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.<sup>[8],[9]</sup> Thus, the project would deliver the mitigation of 400 mt of CO<sub>2</sub>-e (**Core Indicator 6**: 400 mt CO<sub>2</sub>-e mitigated). The standard industry reporting of livelihoods for seaweed aquaculture is approximately 1 direct job per 10 mt of dry weight of seaweed but that is the growing of seaweed. The processing, drying, preparation, sales, seedling production, equipment would 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 that direct livelihoods from enhanced seaweed aquaculture post-harvest handling, the aquaculture production of seaweed and the transport and other allied industry sectors would result in 900 female beneficiaries and 300 male beneficiaries (to be added to beneficiaries in Indonesia below).

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 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 3<sup>rd</sup> 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 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. 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:

$$697,100 \text{ t whiteleg shrimp} \times \frac{1.3 \text{ t of feed}}{1 \text{ ton of shrimp}} = 906,230 \text{ t of feed}$$

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 suggest 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 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), this would 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 reported 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

$$300,000 \text{ t whiteleg shrimp} \times \frac{1.3 \text{ t of feed}}{1 \text{ ton of shrimp}} = 390,000 \text{ t of feed}$$

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) would 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:

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

The black tiger shrimp production of 5,651 t would 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 would double, i.e. 5,651 t / 0.5 = 11,303 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 would be simply the estimated production of black tiger shrimp provided by the SCI minus the 11,303 t shrimp, i.e. 90,000 t black tiger shrimp – 11,303 t black tiger shrimp on feed = 78,697 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 Indonesian Seas Large Marine Ecosystem (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>[12]</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:

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

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.<sup>[13]</sup> Without clear data provided from 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 1,543 male farmers and 532 female workers throughout the supply chains. The total project (Timor-Leste and Indonesia) would result in 1,843 males and 1,784 female beneficiaries (**Core Indicator 11**: 1,843 male beneficiaries and 1,784 female beneficiaries)

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

This project is deeply dependent on the private sector to be the off-ramp for GEF funds. Thus, if the markets and markets 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 STF’s and the Safe Seaweed Coalition. Those institutions will be maintained 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 would 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 would 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, 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 to 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. And although there is no discussion to date within the STF on “substitutes” for fish meal and oil, a product that does not require high manufacturing costs would be attractive to be used to reduce the cost burden of oversight in fisheries supply chains, but also would bring lower risks. Thus, through the proposed work, the utilization of non-traditional ingredients should be explored to not consider fish meal and oil as a fundamental ingredient in feeds.

Another key innovation to be advanced, 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 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 helps 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.

*Institutional Sustainability:*

*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.

The Safe Seaweed Coalition will also act as a markets check on quality and volume growth of seaweed in Timor-Leste. Maintaining the product quality to sell into international markets is a growing concern by all who seek to amplify seaweed aquaculture and maintaining high quality should maintain better prices while connectivity with the Safe Seaweed Coalition will allow for sustainable diversification and financial stability.

*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 markets 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.

### **Scaling up**

As noted in the 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 the post-harvest and quality controls for seaweed such 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 institutionalize the post-harvest and quality control protocols. 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 demonstrate readiness by Indonesia and Timor-Leste to engage in different and newer markets. Fundamentally, this project is to prepare and ready the countries sectors for these market opportunities.

---

[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.

[3] 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.

[4] Boyd, C., & McNevin, A. (2015). *Aquaculture, resource use, and the environment*. John Wiley & Sons.

[5] 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)

[6] <http://www.fao.org/indonesia/news/detail-events/fr/c/1184212/>

[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] 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.

[9] <https://documents1.worldbank.org/curated/en/947831469090666344/pdf/107147-WP-REVISED-Seaweed-Aquaculture-Web.pdf>

[10] 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)

[11] 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.

[12] Boyd, C., & McNevin, A. (2015). *Aquaculture, resource use, and the environment*. John Wiley & Sons.

[13] 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.

## 1b. Project Map and Coordinates

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

Candidate sites are identified below, and subject to review and confirmation during project preparation.



Figure 1. Locations of shrimp aquaculture supply chain activities (with coordinates)



Figure 2. 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

## 2. Stakeholders

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

**Indigenous Peoples and Local Communities** Yes

**Civil Society Organizations** Yes

**Private Sector Entities** Yes

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

Civil society organizations may have a dual role in the context of this proposed project. First as delivery partners for capacity development, training, socialization of concepts, knowledge management etc. Second, as beneficiaries of the upskilling, technology transfer, best practice sharing etc during project implementation.

Numerous stakeholder consultations were conducted between 01 December 2020 and 11 October 2021. A listing of these is provided below (dates can be provided on request). 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 re-doubled, and hopefully addressed by opportunities to travel.

<b>Government Ministries / Agencies</b>	
Timor-Leste	Directorate General for Aquaculture, Ministry of Agriculture and Fisheries (MAF)
Indonesia	Directorate General for Aquaculture, Ministry of Marine Affairs and Fisheries (MMAF)  Directorate for Marine Affairs and Fisheries, Ministry for National Planning and Development (BAPPENAS)  Ministry of Environment and Forestry (MOEF)
<b>Multilateral Development Institutions</b>	World Bank, International Finance Corporation (IFC), Food and Agriculture Organization (FAO), WorldFish Center, United Nations Industrial Development Organization (UNIDO)
<b>Bilateral Development Institutions</b>	USAID
<b>Non-Government Organizations (NGOs)</b>	Roman Laun (Timor-Leste), Yayasan Konservasi Alam Nusantara (YKAN Indonesia), The Nature Conservancy (TNC), World Wildlife Fund (WWF), Coral Triangle Center (CTC)
<b>Multi-Stakeholder Coalitions (including private companies and civil society organizations)</b>	Seafood Task Force (STF), Safe Seaweed Coalition (SSC)
<b>Publicly Funded Research Organizations</b>	European Space Agency (ESA), Clark Labs /Clark University (USA)
<b>Private Foundations</b>	Gordon and Betty Moore Foundation
<b>Assorted technical specialists based in Asia and the Pacific region</b>	Joebert Toledo, Julius Sarria, Djames Lim, Bambang Sumartono, Sri Handayani
<b>Private companies</b>	Larive International (France)

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

Table 1. List of potential key stakeholders and their possible contributions and roles in the proposed project.

Stakeholder type	Stakeholder list	Possible contributions and roles in the project
Government ministries (at central and provincial levels)	<b>Indonesia:</b> MMAF, BAPPENAS  <b>Timor-Leste:</b> MAF	Creating national policies, strategies and action plans that enable direction in support of GEF project outcomes.
Community-level stakeholders	Coastal communities and seaweed farmers, including women  Community-Based Organizations (CBOs)	Development of engagement strategies that are site specific and applicable to local conditions and communities.
NGOs / CSOs	World Wide Fund for Nature (WWF) Indonesia, US, Austria (Fish Forward)  Coral Triangle Center (CTC)  Migrant Workers Rights Network  DFW Indonesia  Roman Laun (Timor-Leste)	Environmental and social sustainability support as critical friend to aid in ensuring project activities are not have unintended harmful impacts.
Private Sector	Cargill, Costco, Wal-Mart, Mars Petcare, Danone, Nestle, Seafood Task Force, Safe Seaweed Coalition	Produce specification requirements, quality control measures, offtake agreements and better management sharing.
Research institutions	Bigelow Laboratories, Auburn University, Bogor University	Feed ingredient sources, methodologies for calculating ecosystem services, feed analyses.

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

**Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).**

“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.

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 “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 is 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 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 lack of access to capital and entry barriers to higher end markets

Women have lower rates of entrepreneurship than men in 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.

A more equitable approach to fisheries and aquaculture holds promise of delivering many potential benefits, including productivity and household incomes, positive nutritional outcomes and improved ecosystems services.

During project preparation, a more detailed gender assessment will be prepared specific to seaweed and shrimp value chains in Timor-Leste and Indonesia respectively. A gender action plan, would include, but not be limited to 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 womens' 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.

Possible gender output indicators could include: i) Number of skilled jobs generated for women, ii) Women's leadership capacity improved, iii) Women's entrepreneurship, financial inclusion and job skills increased, and iv) Protection from gender-based violence strengthened in project areas.

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) womens' 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, improve business acumen, and unlock potential for increased benefits.

#### 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 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 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 design of all knowledge management activities.

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; and/or Yes

generating socio-economic benefits or services for women. Yes

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

Yes

#### 4. Private sector engagement

##### Will there be private sector engagement in the project?

Yes

##### Please briefly explain the rationale behind your answer.

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 markets engagement in horticulture and shrimp value chain loans.

The project will interact with 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 two major aggregators for seaweed harvests in Timor-Leste. This number of traders in the country's supply chain makes the engagement aggregated and a better opportunity for success as it is possible to enable the aggregators and traders to maintain quality controls put in place through this project. Demonstrating the additional value from better handling and storage of seaweed will be compared to a business-as-usual state and the change in value will represent the leverage for the aggregators to engage so long as there is increased profits with farmers. Equity (not equality) in value-sharing in the seaweed supply chain is critical for the project success. 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, the private sector engagement will be enhanced.

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 comprised of commercial members that are owners of farmed shrimp supply chains (farm to 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 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, petfood 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 should 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.

This will be elaborated during the PPG.

---

[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

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 (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 free traceability system - TruTrace
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	Policy and regulation must address these issues of compliance. The government should be/feel empowered to require changes in support of greater prosperity in the export markets.  The private sector – somewhere in the supply chain – will be required to exert the leverage of the purse that they must see this work successful.
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 would 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 known 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	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.	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  Another clear measure to counter this is the reality of certified facilities now and the inability to trace their product in supply chains
7	Inability to improve post-harvest quality of seaweeds	Medium	Lack of private sector attention and desire to support project	Alternative seaweed uses – fertilizer and animal feeds will be explored if export quality is not reached.
8	A lack of desire by seaweed growers to follow a standard operating protocol.	High	It is difficult to bring the private sector into projects at nascent stages because of the long-term planning needed to realize return on investment and without traction in the private sector, the success of seaweed expansion in Timor-Leste will be limited.	A clear plan of when and how to engage farmers with international markets is essential. This planning will require all stakeholders in the project to understand the expectation and contingencies that will be put in place for the next stage of progress in the project to be made. Avoiding stuttered starts and stops, maintaining close proximity to the Timor-Leste government, communities and other stakeholders will be critical to create an off ramp for the project rather than a dead stop when the project ends.
9	The activities of the loans not synced with the activities of the GEF grant (Indonesia and Timor-Leste)	Low	Delays would 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.
10	Covid-19 restrictions prevent travel and in-person meetings (Indonesia and Timor-Leste)	Med	Delays because of the inability to sequester meaningful time and engagement with partners could slow the generation of the full project concept.	Currently, most national, regional and international meetings are conducted through teleconference. These meetings are challenging because of the inability to engage in a more personal manner. This aspect decouples some of the personal relationships that need to be fo

				<p>original relationships that need to be re-stered or strengthened. However, careful planning and heightened sense of spotting challenges or conflict early need to be institutionalized for the success of the project. Moreover, the authentic engagement at the PIF stage will likely have greater benefit during the project development phase should it be carried out under Covid-19 restrictions.</p>
11	Re-instatement of COVID-19 containment measures	Med	Delays in collaboration across countries and across ministries within countries.	Adaptive management measures will be developed to manage a possible re-instatement of COVID-19 containment measures
12	Government capacity as human resources are mobilized elsewhere in response to Covid-19	Low	Some capacity building may be required to get new staff informed of the project.	A mentorship approach will be developed to support the potential changing of staff such that there is a transition period where others can be matriculated in to the project.
13	Change in capacity of other executing entities and the effectiveness of the overall project implementation arrangement as a result of Covid-19	Low	Executing entities may have demands placed on them that require their attention for specific needs in a Covid-19 response that could detract from the project	An implementation plan is proposed for the full concept preparation and roles and responsibilities will be identified with contingency replacement identified ahead of execution.
14	Covid-19 causes limited capacity and experience for remote work and online interactions as well as limited remote data and information access and processing capacities that projects will need to strengthen	Low	Capacity is low or not present for remote work capabilities.	This project will require interactions of numerous people in companies and governments to interact at an intimate level because the project will create risk for businesses and the dealing between implementors and businesses needs to be based on a strong level of trust that is not formed in remote settings.

15	Changes in project implementation timelines because of Covid-19	Low	Covid-19 delays the implementation timelines	Adapting to a Covid-19 lifestyle has fostered a need for greater planning and preparedness. There are examples of how to buffer projects to meet deadlines. Care is needed to ensure that the buffer time is not wasted. Start early and quickly and expect challenges constitutes a new way of thinking during this period
16	Changes in baseline because of Covid-19 (both ongoing and forthcoming projects)	Med	Baseline data are further revised with greater information availability.	It is expected that baseline data may be in need of adjustment as there is so little information about feed ingredients. This is not a result of Covid-19, but rather a lack of transparency in feed ingredients.
17	Change in conditions of beneficiaries because of Covid-19	Low	Beneficiaries that were once identified are no longer applicable to the work.	The level of detail and the approach of this work would not allow for a drastic swing in type of beneficiaries. These beneficiaries will remain being supply chain actors in the respective sectors.

## 6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

### *Institutional Arrangements:*

GEF Agency: The ADB as GEF Agency will provide oversight and direction in line with ADB policies, as well as GEF Fiduciary Standards and GEF Minimum Standards for Environment and Social Safeguards.

### 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.

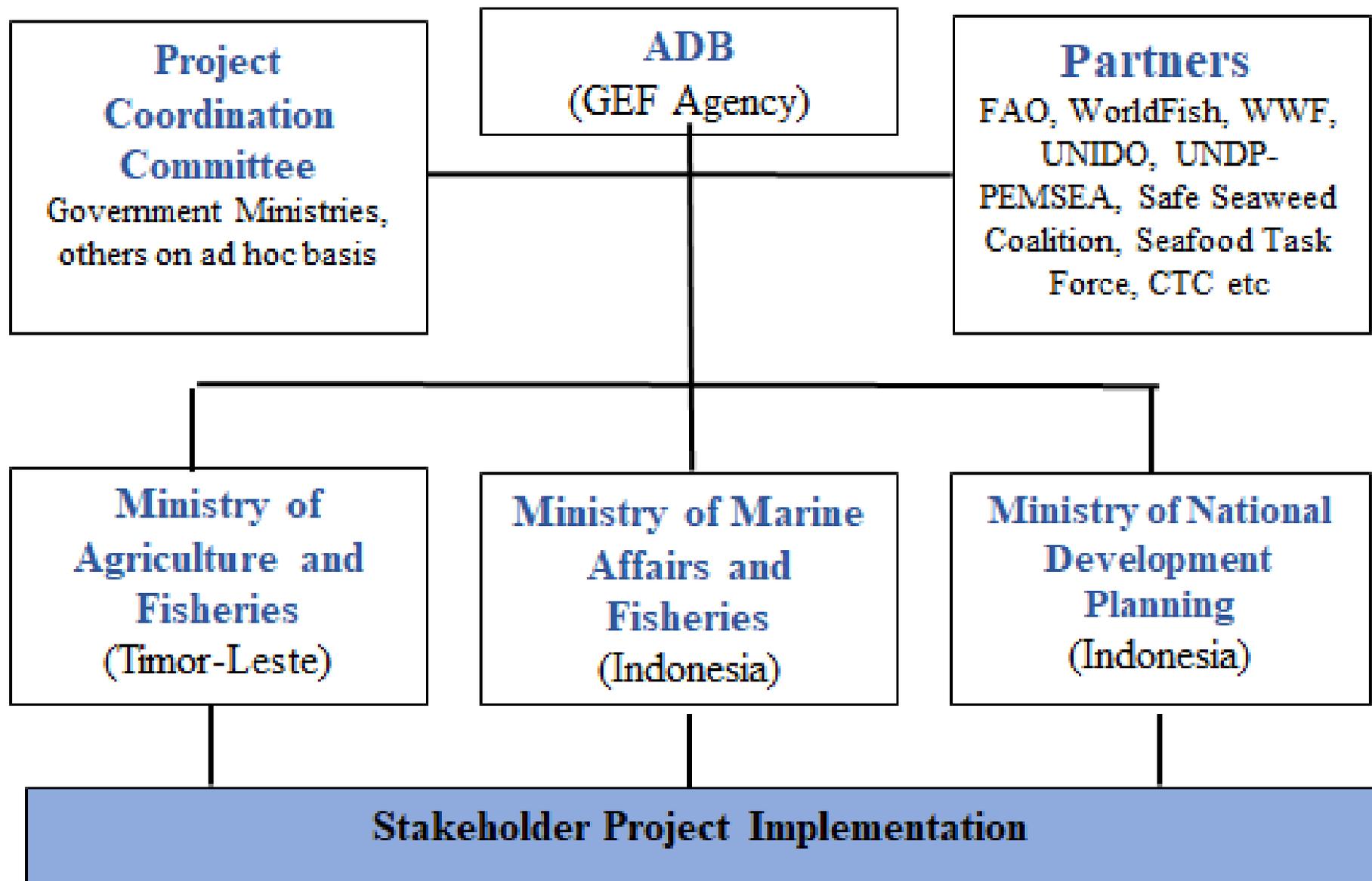


Figure 9. Provisional institutional coordination structure.

*Roles of GEF Executing Entities*

In Indonesia, BAPPENAS and MMAF will develop a joint implementation agreement during the project preparation phase based on continued discussion and refinement of the areas or responsibility identified below (especially 2.1.1-2.2.4). The emphasis on be on joint implementation, but the agreement will define lead and support roles for different actions more clearly.

In Timor-Leste, the MAF may also bring the Ministry of Finance (MoF) into the institutional arrangements. This will be further discussed during the PPG.

Below is a provisional matrix defining roles and responsibilities on an output basis.

Outcome	Output	Responsible Entity/Role
<p>Outcome 1: Development and implementation of national strategies for priority commodities.</p> <p>(Indonesia and Timor-Leste)</p>	<p>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>Lead: BAPPENAS</p> <p>Support: MMAF</p> <p>BAPPENAS as the lead will (i) prepare the term of reference, recruit the consultants and administer the contract; (ii) consult with stakeholders involved in shrimp aquaculture; (iii) lead formulation of the national action plan in consultation with MMAF; (iv) disseminate the strategy and action plan to relevant agencies at national and subnational levels; (v) monitor and evaluate the implementation of the strategy and action plan</p>
	<p>1.2 Marketing and business plan for renovated shrimp sector for greater magnitude of market reach developed</p> <p>(Indonesia)</p>	<p>Lead: BAPPENAS</p> <p>Support: MMAF DGA</p> <p>BAPPENAS as the lead will (i) consult with the private sector, key clients and export players for shrimp aquaculture market; (ii) lead formulation of the Marketing and business plan in consultation with MMAF; (iii) disseminate the Marketing and business plan to relevant stakehol</p>

		ders
	<p>1.3 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>MAF -Directorate General for Aquaculture (DGA)</p> <p>MAF will lead TOR development, consultant recruitment, facilitation of consultations / studies and coordination of communication of the strategy to stakeholders</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</p> <p>(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)</p> <p>2.1.2. Mass balance inspection protocol to validate feed to shrimp tracking generated (Indonesia)</p> <p>2.1.3: 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</p> <p>2.1.4: Five supply chain pilot validation exercises to refine and improve feed to shrimp tracking system supported</p>	<p>Joint implementation by MMAF and BAPPENAS. 2.1.3 lead by BAPPENAS</p> <p>Lead: MMAF Directorate General for Aquaculture (DGA) and Director for Feeds, with the loan implementation team/ project management unit</p> <p>Support: BAPPENAS</p> <p>DGA as the lead will (i) prepare the term of reference, recruit the consultants, and administer the contract; (ii) host the training program; (iii) formulate the Mass balance inspection protocol; (iv) strengthen the tracking system for feed; (v) pilot the shrimp tracking system</p>

Outcome 2.1: Seaweed and

2.1.1. Quantification of ecosystem services

1.3. MMAF DGA

<p>Outcome 3.1: Seaweed aquaculture and capture of nutrients from the ocean expanded</p> <p>(Timor-Leste)</p>	<p>3.1.1: Quantification of ecosystem services through methodologies developed by the GEF 7 Blue Horizons seaweed project and adopted in Timor-Leste to facilitate new approaches to quantifying and compensating for ecosystem services.</p> <p>3.1.2: Workshops conducted to develop/implement 1.2.1 and 3.1.1, including: National Inter-Ministerial Committees (NICs) with high level representation across key ministries,</p> <p>Involvement of relevant private sector players, including seaweed industry actors; and Enable / strengthen a seaweed association</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, carrying capacity</p> <p>3.2.1: Pilot sites in and around Dili Municipality established as a center of excellence in the post-harvest training for government and seaweed growers with a focus on female-centered opportunities to capture greater value from seaweed harvested. (Timor-Leste)</p>	<p>Lead: MAF DGA</p> <p>Support: Dili municipality</p> <p>MAF will lead TOR development, consultant recruitment, facilitation of workshops and meetings, coordination with local government and communities, interaction with private sector, and coordination of site level activities</p>
<p>Outcome 4.1:</p> <p>Timor-Leste seaweed sector engaged / aligned with the Safe Seaweed Coalition</p>	<p>4.1.1: Hosting of pre- and post-project inspection by Safe Seaweed Coalition to support national targets for seaweed aquaculture in Timor-Leste</p> <p>4.1.2: Demonstrated implementation of better management practices and higher quality control, and association of seaweed aquaculture supply chain actors in Timor-Leste</p> <p>4.1.3: Seaweed Growers Association con</p>	<p>Lead: MAF DGA</p> <p>Support: Dili municipality</p> <p>MAF will lead TOR development, consultant recruitment, facilitation of workshops and meetings, coordination with local government and communities, interaction with</p>

	<p>cept enabled, to pool leverage and maintain adherence to better practices and quality control of seaweed production and seaweed products. (Timor-Leste)</p> <p>4.1.4: Expanded collaboration through 3 workshops with GEF 7 Blue Horizon seaweed aquaculture project participants resulted in 2 product off-take agreements (Timor-Leste)</p>	<p>h private sector, and coordination / communications with project stakeholders</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 implemented at project sites (Indonesia)</p> <p>4.2.3: Supply chain renovations of shrimp traceability, brood stock 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>Lead: MMAF DGA and Director of Feeds, with loan implementation team/ project management unit</p> <p>Support: BAPPENAS</p> <p>DGA as the lead will ; (i) implement the shrimp feed tracking system in the project sites; (ii) renovate and demonstrate the supply chain of shrimp traceability</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 and one GEF International Waters Conference delivering IW:LEARN experience notes (Indonesia and Timor-Leste)</p> <p>5.1.2: Sharing of good practice across GEF-supported LME / regional seas programmes 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</p>	<p>Timor Leste: MAF DGA</p> <p>DGA will (i) formulate lessons learned; (ii) develop the knowledge products; and (iii) organize dissemination events and participation in regional meetings and International Waters Conference</p>

	<p>5.1.3 Knowledge management and communications products, such as,</p> <p>a. Lessons on improved quality specifications, 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 inclusion of improved tracking of feed through shrimp aquaculture supply chains</p>	<p>Indonesia:</p> <p>Lead: BAPPENAS</p> <p>Support: MMAF</p> <p>BAPPENAS as the lead will (i) formulate lessons learned; (ii) develop the knowledge products; and (iii) organize dissemination events and participation in regional meetings and International Waters Conference</p>
Project Management		<p>MMAF, BAPPENAS and MMAF will contribute to selection of consultants for project management</p> <p>Each Government entity will identify a GEF focal person to liaise and coordinate with the ISLME focal person (FAO project)</p> <p>Each Government entity will contribute to preparation of technical and financial reports for GEF and ADB, and facilitate project M&amp;E</p>

*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 section on 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 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.

Proposed UNIDO-GEF 7 project in Philippines and Indonesia “Promoting integrated multi-trophic aquaculture in the coastal and marine environment of South-Eastern Asia”, please refer to provisional cooperation framework presented below:

Output /Activity	UNIDO	ADB	Coordinating actions
National strategy formulations / policies / legislation etc	<p>Focus on investment promotion in value chain and IMTA guidance for industry</p> <p>Regional financing tools, making business case for investors. Links with organizations and tools to facilitate investments</p>	Output 1.1 National shrimp aquaculture strategy, business and marketing plan	<p>During PPG ADB and UNIDO will jointly consult with MMAF and BAPPENAS to consider including IMTA in the national strategy, business and marketing plan development</p> <p>Further, the UNIDO project under their Output 1.1.2 might explore linkages with ADB’s Ocean Finance Framework and “blue finance” principles created with a consortium of partners.</p>
Knowledge management and learning systems	<p>Output 3.1.1 IW:LEARN</p> <p>Skill for IMTA, zoning / spatial planning / IMTA modelling</p> <p>NACA – network of aquaculture centres in AP</p>	<p>Output 5.1.1 IW:LEARN</p> <p>Linkages with Seafood Task Force</p> <p>Cross participation and learning across other GEF 7 projects (notably WWF Blue Horizons)</p>	<p>During PPG ADB and UNIDO will develop a coordinated approach to working with the IW:LEARN, and encouraging project coordination across various LMEs (AT SEA, ISLME, BOBLME, SCSLME)</p> <p>During PPG both Agencies</p>

		Lessons learned documentation and sharing	During FFG both Agencies will discuss with MMAF the possibility of a joint knowledge product which would provide general guidance on feed and supply chain traceability and application to different species
Project regional coordination	Primarily through the Network of Aquaculture Centres in Asia-Pacific (NACA) along with Yellow Sea Fisheries Research Institute (YSFRI)	Primarily through the Inter-Ministerial Coordinating Committee of ISLME (facilitated by FAO)	<p>Since the Directorate General of Aquaculture in MMAF is the common GEF Executing Entity, there will be an automatic cross representation.</p> <p>For the ADB project, UNIDO and the Indonesian NACA will be able to participate on <i>ad hoc</i> basis in the Project Coordinating Committee.</p>

-

-

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 suggest that the proposed ADB/GEF project will fall under the Priority Environment Concern (PEC) related to “unsustainable fisheries and aquaculture”. ). 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.

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).

## 7. Consistency with National Priorities

**Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions?**

Yes

**If yes, which ones and how: 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 a 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.

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

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. 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 aquaculture ponds; (ii) Revitalization/development of shrimp and milk fish 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 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 priorities of Timor-Leste Strategic Development Plan (2011–2030), which aims to diversify livelihood opportunities. The Timor-Leste National Aquaculture Development Strategy (NADS) 2012–30, 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.

## 8. Knowledge Management

**Outline the knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.**

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. In particular, the project will develop/publish (i) best practices and standards for seaweed post-harvest handling via a knowledge platform, (ii) feed ingredient footprint methodologies supported by the project to ensure these technologies can be replicated and scaled up in other parts of the region as well as globally by private sector actors, (iii) Lessons on improved zoning, private sector engagement, feasibility of carbon markets, supply demand models for different seaweed products, (iv) a seaweed post-harvest toolkit, and (v) quantification of environmental burdens of shrimp feed.

Further details of the project's approach to knowledge management will be determined during the project development phase in consultation with the relevant stakeholders.

## 9. 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

**Measures to address identified risks and impacts**

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

## 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 sulphur formations that when exposed to air and water create highly acidic conditions. These areas are to be avoided for the success of the farming endeavour. Multiple years of modelling 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 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.

A Climate Risk Profile for Indonesia is attached.

#### *Indigenous Peoples Screening*

The initial screening generated from geospatial analysis of the proposed sites with indigenous people (IP) territories map shows that two project sites are nearby IP territories in South Sulawesi (Takalar) and Bali Province (Karangasem). For this purpose, the project will prepare an Indigenous People Planning Framework (IPPF) to guide subproject selection, screening and categorization, social assessment, and implementation of safeguard plans. If the impact is triggering category B for IP, thus the project will prepare indigenous people plan (IPP) to minimize and mitigate any potential adverse impacts to customary communities at subproject level. Further IP screening will be conducted at site level to confirm the potential impact on IP safeguard issue for all subprojects (e.g feed and broodstock supply, production facilities, irrigation canals, drain, mangrove replanting, post-harvest and logistic facilities, and business strategies). The IPPF and IPP will comply with both government regulations and ADB social safeguard policy statements (2009).

#### *Environment and Social Safeguards*

The ADB loan project will benefit Government in terms of revenues and gross domestic product (GDP) in fishery sector, and welfare improvement for the business and local community. In terms of energy saving, the shrimps will use solar photovoltaic powerplant (as complement and/or substitute) for existing diesel-powered generators (and reducing use of diesel fuels) or PLN's grid. Through silvo-aquaculture concept, the development/revitalization/expansion of ponds will use environmentally friendly and sustainable development approach, especially to protect and enhance the mangrove strips and population.

Some potential impacts may be generated from the construction and operation of the shrimp ponds, among others:

- a. Erosion and siltation problems arising in construction phase
- b. Competition of ponds for water and land resources demanded by other users
- c. Loss of productivity or formation of toxic conditions in ponds from high temperatures, low oxygen and waste accumulation
- d. Depletion of larval and juvenile organisms for pond stocking
- e. Water pollution from pond effluent (nutrient-rich and with varying chemical content depending on intensity of pond management)
- f. Introduction of exotics with subsequent damage to native stocks by competition, predation, spread of disease and parasites
- g. Spread of disease in aquaculture stocks and into natural stocks when docking becomes too dense
- h. Concentration of pens, pilings, and rafts in natural (non-pond) water bodies to extent that navigation is hampered, water circulation is restricted, water quality is decreased, and capture fisheries precluded

However, some are short-term and localized, and only occurs during construction and manageable. Others are inherent with the operation of the shrimp ponds and shall be managed regularly such as siltation, wastewater and excessive feeding which leads to seawater pollution/poisoning.

According to ADB SPS 2009, the project may fall into Category B for the environmental categorization. This classification is based on most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. As identified by desk study, no sensitive areas and/or receptors may be affected by this project. The project is located at the coastal areas with some mangrove strips, but project preparation will identify and avoid the environmentally sensitive areas at the early planning stage. The development of sustainable (silvo-aquaculture) ponds will be combined with mangrove plantation or re-plantation, either at the ponds cluster or beyond the cluster.

Involuntary resettlement (IR) screening is based on the information/data from ADB loan project technical teams (also from Balai) and the result of overlaying the location maps with Google Earth maps. All activities or constructions (such as hatchery and laboratory) are located near Balai's office. The lands required for the new development and renovation of hatcheries, laboratories, and for rehabilitating the ponds are owned by the state. From 3 of UPTs/Balais that have determined the location of pond rehabilitation, MMAF is going to add 2-3 the other locations. Moreover, they will decide the farmer community's ponds involved in IISAP.

If there are ponds owned by community participating in this project, it will impact the farmers so that it will have the potential to affect the households. There is no one who use or utilize the Balai's land for economic activities, but some farmers are affected. For this reason, if households are affected, in limited number, by the project, the IR screening is considered category B. In accordance to ADB social safeguard policy statements (2009), it will need study on Land Acquisition and Resettlement Plan (LARP).

**No GEF funds will be used for involuntary resettlement activities.** The environment screening and categorization assessment form and involuntary resettlement assessment form are both attached.

### Timor-Leste

#### *Climate Risk Screening*

Timor-Leste faces multiple disaster and climate risks. Annual rainfall varies with as little as 500 millimetres (mm) in the northern region and up to 2,800 mm in the western mountainous areas. Current climate variability has already had major impacts on rural livelihoods. The El Niño-induced drought in 2016 caused a fall in production of maize by 40% and rice by 57%, negatively impacting food security. Major flood events were recorded in 2001, 2003, 2006, 2013, 2019, 2020, and very recently in 2021, displacing people, damaging crops and infrastructure, and triggering water-contamination and spread of diseases. It is projected that the seasonality of rainfall will become less predictable, with shorter but more intense rainy seasons, more prolonged dry seasons, and more frequent El Niño events. Climate change combined with watershed degradation, and population increase is expected to directly affect water availability and is likely to negatively impact agriculture. Timor-Leste has a coastline of approximately 700 kilometres. 11 of the 13 districts in Timor-Leste are coastal. The country is situated at the centre of a 648 million-hectare Coral Triangle, known for its exceptional marine life diversity. Though marine fisheries are rich, these are also not fully unregulated, which is due to the limited capacity of the country for effective monitoring and management of this resource. Small village ponds are usually used for inland fisheries in interior and mountainous areas. Aquaculture products like fish, seaweed and shrimp are harvested in small amounts. This sector, although constituting a potential, has promise for positive development in the country. Climate change is likely to impact significantly on the fisheries sector due to the altered rainfall regime and the warmer temperature.

A country climate risk profile for Timor-Leste is attached.

#### *Environment and Social Safeguards Screening*

A rapid environmental assessment has been conducted for the proposed project areas in Timor-Leste, based on best available information. The document is attached.

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 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 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 warning 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.

[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.

[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.

#### Supporting Documents

Upload available ESS supporting documents.

Title	Submitted
21-09-09 INDONESIA IR Categorization Form	
21-09-09 INDONESIA Environmental Screening and Categorization	
21-09-07 Timor-Leste Rapid Environmental Assessment (ADB)	
21-09-13 Indonesia Country Climate Risk Profile	
21-09-13 Timor-Leste Country Climate Risk Profile	

**Part III: Approval/Endorsement By GEF Operational Focal Point(S) And GEF Agency(ies)**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).**

<b>Name</b>	<b>Position</b>	<b>Ministry</b>	<b>Date</b>
Joao Carlos Soares	Director General of Environment	Secretary of State for Environment	9/7/2021
Laksmi Dhewanthi	Director General of Climate Change and GEF OFP	Ministry of Environment and Forestry (MOEF)	10/12/2021

**ANNEX A: Project Map and Geographic Coordinates**

Please provide geo-referenced information and map where the project intervention takes place

Candidate sites are identified below, and subject to review and confirmation during project preparation.



Locations of shrimp aquaculture supply chain activities (with coordinates)



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