

Green Climate Fund Regional Tuna Programme:

Feasibility Study

Introduction and summary

Prepared by the Pacific Community and Conservation International on
behalf of 14 Pacific Island countries for submission to the Green
Climate Fund

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**Annex 2-A of the Funding Proposal “Adapting tuna-dependent Pacific Island
communities and economies to climate change”**



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Acronyms and Abbreviations

AE	Accredited Entity
AA	Anticipatory Action
AGRM	Advanced Grievance Redress Mechanism
ARA	GCF Adaptation Result Area
AWS	Advanced Warning System
AMA	Accredited Master Agreement
AML/CFT	Anti-Money Laundering / Countering the Financing of Terrorism
CCES	SPC's Climate Change and Environmental Sustainability Division
CFAP	SPC's Coastal Fisheries and Aquaculture Programme
CBRM	Community-based Resource Management
CRGA	Committee of Representatives of Governments and Administrations
CMM	WCPFC Conservation and Management Measure
CI	Conservation International Foundation
CI-C4O	Conservation International's Center for Oceans
CKMR	Close-Kin-Mark-Recapture
CMIP	Coupled Model Intercomparison Project
CROP	Council of Regional Organisations of the Pacific
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DCC	Data Collection Committee
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESRA	Environmental and Social Risk Assessment
ESS	Environmental and Social Standards
ERP	Enterprise Resource Planning
EE	Executing Entity
EEZ	Exclusive Economic Zone
EPO	Eastern Pacific Ocean
ENSO	El Niño-Southern Oscillation
EU	European Union
EWS	Early Warning Systems
FSM	Federated States of Micronesia
FAD	Fish Aggregating Device
FAME	Fisheries, Aquaculture and Marine Ecosystem Division of SPC
FAO	Food and Agriculture Organization of the United Nations
FFA	Forum Fisheries Agency
FFC	Forum Fisheries Committee
FRDP	Framework for Resilient Development in the Pacific
FPIC	Free, Prior and Informed Consent
FP	Funding Proposal
FRDP	Framework for Resilient Development in the Pacific
GAP	Gender Action Plan

GBV	Gender-Based Violence
GCF	Green Climate Fund
GEM	SPC's Geoscience, Energy and Maritime Division
GEF	Global Environment Facility
GESI	Gender, Equity and Social Inclusion
GHG	Greenhouse gas
GIS	Geographic Information System
HIES	Household Income and Expenditure Survey
HoF	Heads of Fisheries
HRSD	SPC's Human Rights and Social Development Division
IP/s	Implementing Partner/s
IPP	Indigenous People's Plan
IRMF	GCF Integrated Results Management Framework
IATTC	Inter-American Tropical Tuna Commission
IPCC	Inter-governmental Panel on Climate Change
ISSF	International Seafood Sustainability Foundation
IUU	Illegal, Unreported and Unregulated fishing
LDC	Least Developed Country
MCS	Monitoring, Control and Surveillance
MEAL	Monitoring, Evaluation, Accountability and Learning
MERL	Monitoring, Evaluation, Research and Learning
ML/FT	Money Laundering/Financing of Terrorism
MSMEs	Micro-, Small and Medium-sized Enterprises
NAP	National Adaptation Plan
NCC	National Coordination Committee
NDA	Nationally Designated Authority
ND-GAIN	Notre Dame University Global Adaptation Initiative
NDC	Nationally Determined Contributions
NoL	No Objection Letter
NGO	Non-Governmental Organisation
OFMP	Oceanic Fisheries Management Programme
OECD -DAC	Organisation of Economic Cooperation and Development – Development Assistance Committee
ODA	Overseas Development Assistance
OFP	SPC's Oceanic Fisheries Programme
PEUMP	The Pacific-European Union Marine Partnership
PICCC	SPREP's Pacific Islands Climate Change Centre
PIC	Pacific Island Countries
PICT	Pacific Island Countries and Territories
PIFP	Pacific Island Fisheries Professional
PIFS	Pacific Islands Forum Secretariat
PIOC	Pacific Island Ocean Cluster
PNG	Papua New Guinea
PNA	Parties to the Nauru Agreement

PPF	GCF Project Preparation Facility
PMC	Project Management Costs
PMU	Programme Management Unit
PNG	Papua New Guinea
PNAO	Office of the Parties to the Nauru Agreement
PROPER	Pacific Islands Regional Oceanscape Program, a World Bank project
PP	Prohibited Practices
PHD	SPC's Public Health Division
PPP	Public-Private Partnership
RCP	Representative Concentration Pathway
RFMO	Regional Fisheries Management Organisation
RMI	Republic of the Marshall Islands
rPFSC	regional Pacific Food Security Cluster
RTP	Regional Tuna Programme (this proposed GCF Programme)
SC	WCPFC's Scientific Committee
SEAH	Sexual exploitation, abuse, or harassment
SPREP	Secretariat of the Pacific Regional Environment Programme
SME	Small to Medium Size Enterprise
SDD	SPC's Statistics for Development Division
SDG	Sustainable Development Goal
SEAPODYM	Spatial Ecosystem and Population Dynamics Model
SIDS	Small Island Developing States
SME	Small and Medium-sized Enterprises
SPC	The Pacific Community
SST	Sea Surface Temperature
ToC	Theory of Change
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollars
UoW	University of Wollongong
VDS	Vessel Day Scheme
VHF	Very high frequency
WCP-CA	Western and Central Pacific – Convention Area
WCPO	Western and Central Pacific Ocean
WCPFC	Western and Central Pacific Fisheries Commission
WHO	World Health Organisation

Introduction to the Feasibility Study

This Feasibility Study provides detailed context, background information, and analysis to establish the need, rationale, and proposed design of the GCF regional Programme: *Adapting tuna-dependent Pacific Island communities and economies to climate change*. The Programme is designed to address climate change-related threats to the fish that Pacific Island people have traditionally relied on for a healthy diet, and the regional tuna resources that deliver a broader range of socio-economic benefits for the 14 participating Pacific Island Countries (PICs).¹ These 14 countries are among the most vulnerable countries to climate change on the planet. The Programme will provide practical adaptations, over seven years of implementation (2025–2032), to two major risks posed by continued greenhouse gas (GHG) emissions to Pacific Island communities and economies. These risks are the continued degradation of coral reef ecosystems and redistribution of tropical Pacific tuna resources.

These problems are of grave concern to the 14 PICs participating in the Programme for two reasons. First, coral reefs have traditionally supplied most of the fish needed for domestic food security, given the ease of fishing and limited number of alternative options for obtaining sufficient protein for a healthy diet from agriculture and animal husbandry throughout the region. A gap between how much fish should be consumed by coastal and urban communities for a healthy diet and how much can be harvested sustainably from coral reefs is already emerging in several of the countries, driven by a combination of population growth and degradation of coral reefs due to GHG emissions and its associated impacts on marine ecosystems.

Second, nine of the 14 countries rely heavily on access fees received from industrial fleets fishing for tuna in their exclusive economic zones (EEZs). These countries receive 4-70% of all their (non-grant) government revenue from these fees, which contribute to national programmes for health, education, national infrastructure, disaster preparedness and post-disaster recovery. Preliminary modelling indicates that under continued high GHG emissions 10–30% of the access fees, currently totalling ca. \$500 million per year across the region, could be lost by 2050 as tuna biomass is redistributed to the east, and poleward to some extent, due to ocean warming. Such losses will result from reduced fishing effort in the EEZs of Pacific Island countries as tuna becomes less available, and fishing becomes more lucrative, in the high seas (international waters) to the east.

The Programme will assist national fisheries agencies in the 14 Participating Countries, and the responsible regional fisheries management organizations, the Pacific Community (SPC), the Pacific Islands Forum Fisheries Agency (FFA) and the Office of the Parties to the Nauru Agreement (PNAO) to implement the following interventions to address the problems.

1. Increasing access to tuna for coastal communities to help fill the gaps in fish supply by expanding the use of anchored fish aggregating devices (FADs) to make it easier for small-scale fishers to catch tuna. Although FADs have been installed and utilized in several Pacific Island countries for many years, the use of these tools for improving tuna catches in coastal waters has not gone to scale because national fisheries agencies have only had ad hoc support to deploy FADs. The Programme will shift the paradigm so that FADs become part of the national infrastructure for food security, installed through strengthened national FAD programmes within national fisheries agencies, and sustained by recurrent government expenditure. In the larger participating countries where it will only be possible for the Programme to assist national fisheries agencies to deliver additional FADs for a limited proportion of coastal communities, strengthening national FAD programmes will lay the foundation for progressive expansion of FAD infrastructure through continued investments by governments and their development partners. It is important to note that even with expected climate-driven redistribution of tuna,

catch rates around FADs are projected to remain high enough for FAD-caught fish to make substantial contributions to the food security of the targeted communities.

2. Harnessing the full potential of bycatch available from transshipping and unloading operations by industrial tuna-fishing fleets in regional ports to supply more fish for urban and peri-urban communities. Micro and small enterprises have already capitalised on regulations requiring purse-seine fishing vessels to tranship their catch in port, which has created opportunities for selling low-cost fish and bycatch (unsuitable for canning but suitable for human consumption) to urban and peri-urban communities. However, there is considerable scope for increasing the supply and distribution of this bycatch and tuna. The Programme will assist national fisheries agencies to i) assess the potential supply of bycatch and tuna and the best ways to handle the fish so that it feeds a larger number of people in urban and peri-urban areas; and ii) develop policies based on the information from the Advanced Warning System described below to ensure that this potential is maximized under the impacts of climate change. In atoll nations with relatively low populations, where the supply of bycatch and tuna surpasses the national need, methods will be developed to process the surplus fish into animal/aquaculture feeds and plant fertilizers, thereby contributing to livelihoods and food security. For the larger, rapidly-growing urban populations living in close proximity to some of the main transshipping or unloading ports, the Programme will explore the potential for negotiating with fishing fleets to offload some high-quality tuna in addition to bycatch for food security.
3. Develop an Advanced Warning System (AWS) to reduce uncertainty associated with preliminary modelling indicating that ocean warming will result in progressive redistribution of tuna biomass from the EEZs of many Pacific Island countries to the high seas. The preliminary modelling has helped raise awareness of the potential impacts of ocean warming on national economies, however, there are weaknesses to be overcome in the modelling approach before the information can be used to design adaptation options with confidence. The AWS will reduce uncertainty in the modelling by improving the spatial resolution, from $2 \times 2^\circ$ to $0.5 \times 0.5^\circ$, and incorporating the effects of ocean warming and acidification on the food web that supports tuna. It will also produce shorter-term forecasts (5-10 years) as well as longer-term projections (>15 years), and, applying tested (mark recapture tagging) and new methodologies (genetic technologies to determine kinship relationships), identify the spatial structure of tuna stocks to help target the priority areas for application of the forecasts and projections. In addition, the AWS will develop a fleet dynamics model to assess the implications of changes in fishing patterns due to tuna redistribution for future government revenue. To build the AWS, data will be collected across at least 3.4 billion hectares of the Western and Central Pacific Ocean (WCPO), focusing on the area where the vast majority of tuna catches are made.

This Feasibility Study has been prepared to:

- Support the preparation of a Funding Proposal for the Regional Tuna Programme (RTP) by assembling supporting information and to facilitate access to the data, models and assumptions that led to the proposed Programme approaches, targets and implementation modalities.
- Document the dependence of the 14 Pacific Island countries participating in the RTP on the region's fisheries resources for food security and economic development (including employment).
- Present analyses of the current and projected impacts of climate change on the vulnerable communities and economies that depend on tuna across the Pacific Islands region.²
- Provide evidence for the effectiveness and responsiveness of the Programme's selected approaches to address the adaptation needs of the 14 participating countries.

- Describe the arrangements discussed with all participating countries to sustain the benefits of the Programme once support from GCF concludes.

This Feasibility Study is comprised of a general introduction and five chapters. Each chapter is based on substantial background research and review of relevant policy, scientific and technical reports and studies which are cited in endnotes. Supplementary supporting material is provided in accompanying appendices for each chapter.

Chapter 1: Regional marine fisheries sector overview

This chapter covers the ethno-graphic structure, demography, governance and political stability, geography and vulnerability of the region, followed by a description of the diversity and production of coastal fisheries resources and the nature of, and substantial catches made by, the major industrial fisheries in the region. It also addresses the frequently asked question, “Are Pacific Island fish stocks overfished?” and explains that (i) although some coastal fisheries in the vicinity of population centres have been over-exploited, coastal fish stocks in the many remote areas of the 14 countries participating in the Programme remain in a relatively healthy condition compared to other areas of the world; and (ii) none of the tropical tuna species caught by industrial tuna fleets in the region have been overfished in the past, and overfishing is not presently occurring.

The chapter includes an assessment of the vital role that coastal fisheries have traditionally played in domestic food security, the emerging gap in fish supply driven by population growth, and the essential role that tuna can play in filling the gap. Details of the advantages of industrial tuna fishing to national economic development, including employment and significant contributions to government revenue from fishing access fees, are provided. The chapter concludes with the arrangements made by regional and national institutions to support sustainable management of both coastal fisheries and industrial tuna fisheries.

Country Profiles are appended. They provide a brief overview of the physical and biological features of the 14 Participating Countries, together with their ethnic and cultural diversity, political systems, customary marine tenure, demography, nature of local economies and limitations to economic development, and the significance of their EEZs to their economies. The nature of coastal and industrial tuna fisheries, national policies for sustainable management of marine fisheries, recent catch history, and status of fish stocks are also profiled.

Chapter 2: Climate change vulnerability assessment

The climate change vulnerability assessment documented in the chapter presents a comprehensive description of the projected, climate-driven changes to the Western and Central Pacific Ocean (WCPO), and the vulnerability of communities and economies, based on an end-to-end ‘climate-to-fish-to-fisheries-to-socioeconomic impact’ approach. It describes the features of the surface climate coupled to the bio-physical features of the WCPO, and the coastal habitats and large marine ecosystems (food webs) that respectively support national coastal fisheries production and the region’s rich industrial tuna fisheries. It then projects changes to coastal habitats and the key features of the WCPO as a consequence of continued greenhouse gas (GHG) emissions, including projected changes in sea surface temperature, pH, dissolved oxygen, ocean currents, nutrient supply and the dynamics of the five ‘ecological provinces’ comprising the WCPO including the Warm Pool, under high (RCP8.5) and moderate (RCP4.5) emission scenarios.

The projected changes to coastal habitats and the WCPO are cascaded to assess the vulnerability of coastal fisheries resources to the direct and indirect effects of climate change, in terms of projected

reductions to coastal fisheries production and the availability of fish to contribute to the nutrition of growing coastal communities in the participating countries (discussed below)

Similarly, the vulnerability of tuna to the direct and indirect effects of climate change is assessed on the basis of currently available information generated by modelling changes in tuna biomass across the region. This information is used to identify the projected impacts of progressive redistribution of tuna from the EEZs of the nine tuna-dependent countries¹ to the east and into the high seas, including potential reductions in purse-seine catches of tuna from these EEZs and the related loss of government revenue for countries (discussed below). The implications of tuna redistribution for those countries in more subtropical waters, which could have higher tuna biomass in their EEZs in the future, are also considered.

The food security vulnerability of communities in each country due to shortfall in coastal fish supply is assessed, based on estimates of national availability of coastal fish per person per year in each of the 14 countries by 2030 and 2050 under high and moderate emission scenarios. This analysis identifies countries expected to have a shortfall in the availability of fish per capita recommended for good nutrition due to the combined effects of population growth and climate change in 2030 and 2050. In countries where adequate coastal fisheries production is expected to be available, some urban and peri-urban communities are still expected to be exposed to shortages of fish due to the difficulties/expense in transporting fish from remote coral reefs to population centres. This analysis identifies the fish required per capita to meet the needs of communities in 2030 and 2050 and forms the basis for planning the Activities described in Outputs 1 and 2 in the logframe for the Programme to help increase access to the fish required for good nutrition of the target populations in each participating country.

Chapter 2 also summarises the implications of the potential effects of tuna redistribution on catches made by industrial tuna fleets, and on the government revenue derived from tuna fishing access fees by the nine tuna-dependent participating countries. The progressive redistribution of tuna from the EEZs of these countries into the high seas would reduce demand for fisheries access to their EEZs, resulting in lower contributions of fishing access fees to national economies. The uncertainties identified during the course of the tuna modelling inform the need for, and design of, the 'Advanced Warning System' (AWS) to be developed under Output 3 in the logframe for the Programme to enable the tuna-dependent countries to identify with confidence the most practical adaptations to retain the present-day benefits received from tuna, regardless of the redistribution of the fish. The AWS will also enable the subtropical countries to assess any opportunities to capitalise on or mitigate the effects of climate-driven tuna redistribution with greater certainty.

This chapter concludes with a description of the key fisheries and climate-related policy documents that have been developed, and are implemented, by the 14 participating countries. It is these policy documents that have guided the preparation of this Funding Proposal.

Chapter 3: Options analysis and financial and economic analysis

The Options Analysis presented in Chapter 3 has two main parts, those relating to Component A - seeking increased supply of dietary protein for domestic consumption, and those relating to Component B - predicting changes to the tuna resources in the WCPO. The first relates to the activities planned for Component A of the RTP and describes the advantages and disadvantages of providing dietary protein for the nutrition of rapidly-growing Pacific Island populations using

¹ Cook Islands, Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu.

imported foodstuffs or locally-produced alternatives to tuna. A cost benefit analysis (CBA) is used to compare the advantages and disadvantages of increasing access to tuna, or relying on alternative sources of protein, to provide good nutrition for Pacific Island communities. The CBA is based not only on cost but also on the nutritive value of the various products. The second part of the Options Analysis considers alternatives to the AWS to be developed under Component B of the RTP for empowering tuna-dependent economies to adapt to climate-driven redistribution of tuna.

The Financial and Economic Analysis (FEA) undertakes a detailed, scenario-driven analysis of Components A and B of the RTP to determine the economic benefits of each aspect of the Programme's proposed interventions. The scenarios include situations with and without the Programme's main Activities (designed to increase access to tuna for coastal and urban communities and develop the AWS).

The analysis of the Programme uses a financial CBA which assesses the feasibility of strengthening national FAD programmes and the increased supply of tuna from bycatch and transshipment of fish from the industrial tuna fishery under different scenarios of population growth, urbanisation, coral reef degradation, and development of the AWS under varying levels of projected reduction in PICs access fee revenue. The number of people benefitting from increased access to tuna for food security, and governments economic dependency, are the focus of this part of the FEA.

The economic analysis includes the wider costs and benefits to society associated implementation the proposed activities. For example, unless the activities associated with equipping and training small-scale fishers to operate safely at sea are implemented, the costs associated with search and rescue missions in remote areas are likely to be a greater burden to governments.

Alternatives to the AWS for informing tuna-dependent economies about how to make adaptations that will enable them to maintain the present-day economic benefits that they receive from tuna-fishing access fees, regardless of the redistribution of the fish, are considered. Options are not limited to alternative systems for informing adaptations but also include adaptations such as adding value to tuna through improved post-harvest processing. This has potential to reduce the loss of access fees because, although fewer fishing days may be sold due to less fishing occurring in EEZs, the daily rate for a vessel day should increase if the price for tuna improves due to value-adding.

In reality, there are no current alternatives to the AWS to provide PICs with forecasts and projections of the scope for tuna redistribution due to changes in the WCPO marine ecosystem, and the impact on tuna catches and government revenue. In the absence of the AWS, the region would continue to rely mainly on the Oceanic Fisheries Programme (OFP) at the Pacific Community to progress its routine work on tuna stock assessments, dynamics and biology; oceanographic modelling; and stock structure to inform management and conservation decisions in the regional fisheries management organisation, the Western and Central Pacific Fisheries Commission (WCPFC).

Although this work is essential and prioritised through WCPFC's scientific processes, it runs the severe risk of being ineffective if it does not incorporate the effects of climate change. Given the increasing urgency associated with evaluating how the impending impacts of climate change are likely to affect the assessments made by OFP listed above, the AWS provides the only practical opportunity to fast-track this work, strengthen coordination across research efforts, including in regard to economic modelling, and improve the quality of advice available for decision-making both at national and regional level, including harvest strategies and other management decisions – advice that will identify how to minimise the effects of tuna redistribution on tuna-dependent Pacific Island economies.

Chapter 4: Programme Overview

The overview of the Programme commences with a summary of the national and regional consultations that were supported through the Project Preparation Facility (PPF) grant and co-finance raised by the project partners, to inform the design of the RTP. These summaries include a breakdown of participation by gender. It also presents a summary of relevant fisheries and climate-related initiatives and programmes being implemented at the national and regional level in the region. These initiatives were reviewed in 2023 and by 2025, when the RTP is projected to begin implementation, it is likely that the number and variety of projects and activities supported by various bilateral and multi-lateral development assistance partners will have changed significantly. Chapter 4, therefore, makes the point that it will be imperative for the Programme to undertake another analysis of related projects early during implementation to optimise opportunities for the RTP to add value to initiatives underway at that time, and to avoid duplication.

Barriers preventing solutions to the socio-economic problems caused by coral reef degradation and tuna redistribution are summarised. These include barriers related to food insecurity of coastal and urban communities and barriers related to economic development due to tuna redistribution. Interventions to remove the barriers, around which the Programme is broadly designed, are identified and described. They include strengthening national FAD Programmes targeted at coastal communities and increasing the availability of tuna and bycatch from transshipping and unloading operations during industrial fishing operations for urban and peri-urban communities, to increase access to tuna for domestic consumption. Both these Outputs include strengthening processing, distribution and marketing of FAD-caught fish, and tuna and bycatch transhipped or unloaded. Programme interventions supported under Components B will address barriers currently preventing tuna-dependent Pacific Island countries from understanding the likely timing and extent of tuna redistribution and identifying the most efficient adaptations needed to enable them to retain the present-day benefits that they receive from tuna access fees, regardless of the redistribution of the fish.

This Chapter explains that the Programme will contribute to a paradigm shift by strengthening two established but under-performing vehicles to support Pacific Island countries to maintain their traditionally high levels of fish consumption under a changing climate: (i) national FAD programmes to increase access to tuna for coastal communities as the supply of fish from coral reef ecosystems declines due to ocean warming and acidification, and (ii) transshipping and unloading operations to supply bycatch and tuna to urban and peri-urban communities by addressing the disruptions that are expected to occur to these operations as industrial fishing effort moves further to the east due to ocean warming. These vehicles capitalise on the region's rich tuna resources without threatening the status of tuna stocks and will confer increased food security and resilience to both coastal and urban communities, including enhanced livelihoods – benefits that will otherwise be seriously diminished due to a combination of the effects of climate change on coral reefs and population growth. Innovations for meeting per capita dietary animal protein requirements of rapidly growing Pacific Island communities will be complemented by widespread campaigns to raise awareness of the need to rely more heavily on tuna for food security.

The Chapter also describes another paradigm shift that will be delivered through establishment of the AWS to inform tuna-dependent countries about the risks posed to their economies from climate-driven tuna redistribution, and the most appropriate adaptations to address this threat. The AWS will (i) empower island nations to secure equitable access to tuna resources as climate change alters the distribution of tuna; and (ii) provide the foundation for revisions to co-operative fisheries management arrangements within the region by producing the tuna 'resource maps' needed to document the changing spatial structure of tuna resources and identify what are expected to be new

sets of stakeholders for some stocks. The AWS will provide reliable, timely and accurate information and advisories on expected changes in the timing and extent of tuna catches in the EEZs of tuna-dependent PICs and pave the way for these countries to retain access rights to the shared fisheries resources that underpin their economies by increasing their capacity to negotiate for solutions founded on science and evidence-based decision making. Enabling governments to engage more effectively in the often-difficult discussions of 'loss and damage' within UNFCCC will help to ensure that more equitable outcomes are achieved for a vulnerable region and its populations.

Programme activities are grouped within two broad components:

- Component A – Adaptation to harness tuna for food security of Pacific Island communities as coral reefs are degraded by climate change. This component contains sets of activities designed to:
 - strengthen and invest at scale in national FAD programmes to enable coastal communities to catch tuna (and other pelagic fish species) so that they continue to have access to dietary protein as the supply of fish from degraded coral reefs declines and human populations grow; and
 - design and implement systems for distributing more bycatch and tuna from transshipping and unloading operations by industrial fishing fleets that will provide urban and peri-urban communities with greater access to fish for domestic food security.
- Component B – Adaptation to reduce risks to Pacific Island economies from climate-driven tuna redistribution: This component includes a set of activities to establish a region-wide AWS to gather and analyse the data needed to more accurately determine future abundance and distribution of tuna as the fish respond to ocean warming due to climate change.

This Chapter details three key benefits of these interventions:

1. The deployment of the ~330 FADs across the region, and the training and equipping of small-scale fishers to fish safely and effectively around these FADs, during the strengthening of national FAD programmes is expected to deliver additional tuna meals for a total of ~560,000 men, women and children from coastal communities in the 14 participating countries. In the case of the smaller countries, 50-100% of the entire population will have access to additional tuna for local consumption. In the medium to large PICs, the benefit will be targeted at the most vulnerable communities, ranging in size from 30,000-90,000 people. Subject to confirmation of annual average catch rates from the FADs deployed by the Programme, the strengthened national FAD programmes are expected to deliver between 9 and 18 million fish meals per year, with each fish meal providing the daily protein intake recommended by the World Health Organisation and the Public Health Division at the Pacific Community (SPC). In the five smallest countries in the region, the Programme is expected to deliver up to 4-10 additional fish meals per person per month.
2. Following improvements to the supply and distribution of bycatch and tuna from transshipping and unloading operations at regional ports, a total of ~290,000 men, women and children from the 10 countries where these operations occur are expected to have increased access to fish. It is expected that this intervention will supply ~13 million additional nutritious fish meals per year, equating to 3-4 additional meals per month for the target beneficiaries.
3. The AWS will enable the nine tuna-dependent Pacific Island economies to understand the future timing and extent of tuna redistribution in relation to their EEZs with much greater confidence. This information can then be used by these vulnerable Small Island Developing States (SIDS) to

negotiate through the WCPFC, or using the UNFCCC's loss and damage provisions, to retain the socio-economic benefits they have historically received from their tuna resources, regardless of the redistribution of the fish. Successful negotiations informed by the AWS will prevent loss of essential government revenue.

The other five participating countries, which are located in subtropical areas outside the prime tuna-fishing areas in equatorial waters, will also benefit from the AWS. In particular, it will enable these countries to determine whether the projections from preliminary modelling, which indicate that the biomass of tuna could increase in their EEZs due to poleward redistribution, are likely to eventuate. If so, it will enable these countries to evaluate adaptations to capitalise on opportunities, e.g., increased industrial fishing and/or tuna processing.

The information produced by the AWS will also improve the management decisions and strategies required to sustain the productivity of the industrial fisheries across the >3.4 billion ha of the WCPO where most tuna fishing occurs, and the ecosystem that underpins these fisheries. A key indicator for the effectiveness of the AWS will be the extent to which the WCPFC's Scientific Committee incorporates information from the AWS into its recommendations to the Commission for the conservation and management measures required to sustain the production of these globally-significant tuna resources during ocean warming.

The evidence generated by the AWS will support the preparation and negotiation of multi-lateral agreements, designed to enable tuna-dependent PICs to maintain their access rights to shifting tuna stocks and the associated economic benefits regardless of the redistribution of the fish. This section describes how the data from the AWS will be used to inform management decisions (harvest strategies, Commission Management Measures (CMM's) and resolutions made by the WCPFC to ensure continued effective management of tuna stocks under the impacts of climate change. The Theory of Change illustrates the linkages between Programme activities and outputs, and how these will lead to achieving the desired outcomes, co-benefits, and ultimately, the transformational paradigm shift that will bring about greater resiliency to climate change threats, which is the overarching goal of the Programme.

The establishment of the monitoring system for the Programme is also described. The primary responsibility for day-to-day Programme monitoring and implementation rests with the Programme Management Unit (PMU) to be located at the headquarters of the Executing Entity, the Pacific Community (SPC), in Noumea. The PMU will ensure that the indicators included in the Programme results logical framework are monitored and reported on annually and will objectively report progress. Programme activities and outputs will be monitored separately as well as in relation to the achievement of higher-level Programme results and GCF-level indicators. Programme monitoring and evaluation will cover two levels of performance: GCF-level performance (expected performance against investment criteria) and Programme-level performance.

The Chapter also describes Programme implementing arrangements. All Programme activities will be implemented in close coordination with the 14 Participating Countries by SPC as the Executing Entity, and the Pacific Islands Forum Fisheries Agency (FFA), the United Nations Food and Agriculture Organisation (FAO), and the Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO) as Implementing Partners. The Office of the Parties to the Nauru Agreement will also assist with implementation. Governance arrangements are described. These include the establishment of a Programme Steering Committee (PSC) which will meet at least once annually, supported by the

PMU in a technical and administrative advisory capacity. Reporting to CI's GCF Agency, serving as Accredited Entity for the RTP, is also described.

SPC will provide GCF funding and/or goods and services to each of the 14 PICs to support national-level implementation of Programme activities. The regulatory and administrative arrangements for the transfer of funds to the 14 PICs are described. SPC will also engage consultants, vendors, and other service providers to support the implementation of Programme activities. SPC will enter into a service agreement with each contracted entity. In addition, although no transfer of GCF funds will be involved, SPC will engage with relevant regional or technical organisations or entities for technical guidance or other collaboration.

Chapter 5: Sustainability Plan

This Chapter presents a review of sustainability opportunities for each component of the RTP. It assesses that the potential for sustaining the two Component A initiatives is high. This will be driven by the increasing realisation that, apart from reverting to increased imports of relatively cheap foods of lower nutritional value, with consequent adverse implications for community health and wellbeing, tuna and associated oceanic pelagic fish offer an obvious and relatively accessible resource to address current and future food security needs.

The first initiative of Component A centres on utilisation of nearshore anchored FADs to increase access to tuna for the food security of coastal communities. Provided that national FAD programmes increase the number of fish meals available per person per month and make a significant contribution to fill the gap in fish supply due to a combination of the adverse impacts by climate change on coral reefs and other coastal habitats and increasing human populations, there is a sound basis for FADs to be recognised as important national infrastructure for food security supported by recurrent expenditure from national budgets. As FADs become an embedded national asset, as opposed to an occasional coastal feature supported on an ad hoc basis by donors and development assistance partners, their contribution to domestic food security will be increasingly appreciated. This will generate broad community and political interest in providing on-going direct support from national budgets. This applies to all 14 participating countries.

The primary focus of the second initiative of Component A is improved distribution of bycatch and tuna from transshipment and unloading operations by the industrial tuna fleets. In six of the 14 participating countries this will concentrate on the purse-seine fishery. Longliner fishing vessels targeting albacore also unload bycatch and tuna at ports in Vanuatu, Fiji, Samoa and Tonga. The Programme will support activities that improve the availability of tuna and bycatch suitable for human consumption from these vessels. The Programme will support efforts to improve the shelf life of the offloaded fish and promote marketing and distribution initiatives to achieve an increase in the availability of bycatch and tuna to urban and peri-urban communities adjacent to landing sites.

The sustainability of this element of the Programme will be driven by the opportunities that increased availability of appropriately handled transhipped and unloaded bycatch and tuna offer for micro and small medium enterprises (MSMEs) in urban and peri-urban communities. These MSMEs support significant participation by women. As the availability of reef-associated fisheries resources is adversely impacted by climate change, and populations in urban and peri-urban environments in the participating countries increase, both the need and the potential for providing alternative sources of fish protein will escalate. This transition will be supported by governments intent on sustaining the gains made during the Programme to ensure that urban and peri-urban populations have improved access to fish for local consumption by developing and implementing policies that lead to increased accessibility to transhipped and unloaded bycatch and tuna from industrial fleets.

Component B of the Programme builds strongly on the adaptation work, agencies, capacities, and systems already in place in the region. The AWS will contribute to the practical implementation of the Western and Central Pacific Fisheries Commission (WCPFC) Resolution on climate change³ adopted in late 2019 by providing the additional capacity required to operationalise the Resolution. The AWS is designed to add further necessary capacity to PIC governments, SPC, and FFA (as well as to the sub-regional groupings such as the PNA, Melanesian Spearhead Group, and the South Pacific Group) to better identify the range of adaptation strategies needed to build the expertise required to support PICs as they adapt to the consequences of a redistribution of tuna biomass to the east and to the high seas. This capacity is needed to work in an expedited manner on adaptive fisheries management and investment strategies and regimes required to ensure the sustainable socio-economic wellbeing of PICs.

With small economies reliant on a narrow resource base and vulnerable to international political and economic developments often exacerbated by a changing climate, financial sustainability is a perennial concern for PICs. With the exception of the larger islands in Melanesia with significant agriculture, forestry and mining sectors, and several Polynesian and Micronesian countries with substantial tourism sectors, the valuable regional tuna resource is the key natural asset underpinning the economies and social welfare of many countries.

The importance of tuna to so many Pacific Island economies means that potential for long-term sustainable support for the AWS is high. This is because it will have a direct influence on key decision-making at the national level and in the WCPFC relating to the regulation of catch and fishing effort. The economic performance of the fishery will be largely determined by scientific advice generated by the AWS. It will underpin decisions that have implications for the national economies of PICs, the economic performance of industry and the total on-going value of the fishery.

Consequently, there is a high degree of confidence that financial contributions to the on-going operation of the AWS will be forthcoming from WCPFC (see Chapter 3). There are two main reasons for this optimism. First, the Oceanic Fisheries Programme at SPC, which will develop the AWS during the implementation of the Programme, has been the Scientific Services Provider for the Commission since the Commission commenced operations in 2005. Second, WCPFC has adopted a resolution on climate change (Resolution 2019-01⁴ and the AWS is expected to be the main tool for addressing Part 2 of the Resolution related to supporting “further development of science on the relationship between climate change and target stocks”.

Given that the tuna industry will use AWS-related information and advisories to determine future fishing strategies and investments there is also significant potential for industry to contribute to AWS operations in the future. The main ways in which industry will support SPC to develop the AWS and produce the forecasts and projections of climate-driven tuna redistribution include:

- a). Observers to collect the tuna tissue samples across the WCPO and Eastern Pacific Ocean (EPO) to be analysed by modern molecular methods to accurately describe the stock structure and population dynamics of skipjack, yellowfin, bigeye and albacore tuna;
- b). Tuna-tagging and tracking to verify the distribution, size and behaviour of all identified tuna stocks; and
- c). Collection of spatially explicit and accurate data on the physical and biological state of the Pacific Ocean, including collection of acoustic data to assess the responses of tuna prey to climate change.

In addition to their membership fees paid to WCPFC, there is potential for the PICs themselves to contribute financially to the ongoing costs of operating the AWS. This is in their interest due to the implications for national economies of tuna re-distribution because of climate change and the value of AWS information in forecasting and projecting future features of the fishery including those associated with changes in revenue generated from the fishery within their EEZs.

In addition to discussing key considerations and elements associated with efforts to promote the sustainability of outcomes and achievements of the RTP, this Chapter includes a discussion of principles related to an exit strategy for the Programme. A provisional exit strategy, to be considered and refined as appropriate at the Inception Meeting of the Programme, is included.

Endnotes

¹ Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Solomon Islands, Samoa, Tonga, Tuvalu and Vanuatu.

² The Feasibility Study, in part, has been informed by a series of Technical Studies supported under PPF Activity 1.²

³ WCPFC Resolution 2019-01. Noting that WCPFC resolutions are voluntary and non-binding www.wcpfc.int/doc/resolution-2019-01/resolution-climate-change-it-relates-western-and-central-pacific-fisheries

⁴ <https://cmm.wcpfc.int/resolution/resolution-2019-01>