

**Adapting tuna-dependent Pacific Island communities and economies to climate
change**

**Study 9: Identification of financing mechanisms, supporting policies and
capacity needs to sustain the benefits achieved
through investment by GCF**

**Part 3: Finance mechanisms, supporting policies and institutional
arrangements to support the Advance Warning System (AWS)**

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Executive summary

Component B of the Green Climate Fund (GCF) Regional Tuna Programme (RTP) titled: Adapting tuna-dependent Pacific Island communities and economies to climate change, under RFP22-3866 addresses the need to manage the risks to national economies, and the vulnerable populations who depend on public spending associated with tuna populations by providing reliable information on the extent and timing of climate-driven redistribution of tuna. This will be achieved through the development of an ‘advance warning system’ (AWS) for tuna-dependent economies to predict nearer-term changes in the distribution of tuna across the tropical Pacific Ocean, including robust forecasts in 1–10-year timeframes and at spatial scales relevant for national and regional level adaptation. This report describes the institutional framework and capacity to support the AWS beyond the lifetime of the GCF-funded program as well as the current policy framework and future needs that will support its implementation. The financial and capacity needs that will be required after the initial 7 years to ensure the financial sustainability of the program are assessed.

Development of the AWS will be facilitated by the Pacific Community (SPC) under its Oceanic Fisheries Program (OFP). The OFP currently provides technical support to the participating Pacific Island countries for tuna fisheries research, fishery monitoring, stock assessment and data management. The OFP is also the contracted Science Service and Data Management Provider to the Western and Central Pacific Fisheries Commission (WCPFC) which is responsible for the overall management of the highly migratory tuna stocks in the Western and Central Pacific Ocean (WCPO).

The program of work for SPC’s Division of Fisheries, Aquaculture and Marine Ecosystems (FAME), under which the OFP operates, includes climate and marine ecosystems-related assessments, advice and capacity building.¹ This institutional framework will ensure that AWS related activity is integrated to the broader program of work of SPC and that AWS initiatives will be sustained within SPC beyond the life of the GCF project.

The Pacific Islands Forum Fisheries Agency (FFA) is an advisory body providing expertise, technical assistance and resource management advisory support to its members who make sovereign decisions about their tuna resources and participate in regional decision-making on tuna management through agencies such as the WCPFC. The capacities of the FFA also include economic analysis and sustainable investment advice as well as the provision of climate advice and support to its members engaged in international negotiations.² The RTP will support these efforts and FFA is well-equipped to continue this role beyond the lifetime of the RTP.

¹ SPC 2011, *Modelling the impacts of climate change on tropical tuna*, accessed June 2023. <https://oceanfish.spc.int/en/major-projects/climate-change>

² FFA interview 2023

The Parties to the Nauru Agreement (PNA) is an important regional grouping of tuna dependent economies³ that supply 95% of the region's purse seine tuna resources under its vessel day scheme (VDS). The AWS will provide both management and economical advice and forecasting critical for the objective of the PNA.

Given this strong institutional context the AWS will be operated and linked to no additional supporting policies were identified regionally or nationally to support its implementation beyond the operational framework needed to revise and adjust priorities. There are also the necessary agreements already in place between the WCPFC and Inter American Tropical Tuna Commission (IATTC) to accommodate the scientific cooperation needs of the AWS in relation to tuna resources that are shared with the Eastern Pacific Ocean (EPO).

The AWS also supports the implementation of the WCPFC Resolution 2019-01 on climate change⁴, especially its points 1-4 and provides the membership with means of meeting these climate ambitions.

In terms of long-term sustainable finance and capacity needs the operating costs after the 7-year setup period under the RTP is under USD1 million annually (increasing to just over USD1 million annually 5 years after the RTP). This is just 0.01-0.02% of the current annual value of tuna fisheries of USD5 billion.⁵ Given the moderate cost and the potential for benefits for the industry such as cost savings in terms of fuel, more efficient planning and operations and others, to be adequately quantified during the RTP, it is potentially a key cost recovery mechanisms under the PNA VDS, the WCPFC or directly with industry can be implemented to provide at least part of the long-term finance requirements of the AWS.

In addition, existing regional capacity such as the Regional Observer Program (ROP) can help sustain the data collection needs of the AWS.

In the event that cost recovery mechanisms prove difficult, or do not cover the full costs, other financial mechanisms are also discussed. Options include finance under the United Nations Framework Convention on Climate Change (UNFCCC) Loss and Damage Fund. Given that the AWS will be a key in quantifying any further potential loss occurring for the PICs AWS operational costs could fall under the finance provided by the Fund. Alternatively, more innovative finance mechanisms are discussed that if developed in the region could include AWS costs as part of the approach/investments made. One such example is climate insurance which also could use AWS data and hence provide finance towards it maintenance. Innovative debt instruments and Blue Economy approaches, including impact investments, are also discussed. The different policy and finance options are ranked in terms of relative accessibility on the basis of the likely timeline of

³ Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands, Tuvalu plus Tokelau.

⁴ [WCPFC climate resolution](#)

⁵ The Pacific Forum Fisheries Agency (2022). Economic and development indicators and statistics: Tuna fisheries of the Western and Central Pacific Ocean 2022.

implementation, additional capacity needed to deliver as well as the level of innovation/risk involved.

Table of contents

<i>List of acronyms and abbreviations</i>	<i>vi</i>
1. Objectives and main tasks of AWS	1
2. Analysis of the WCPFC climate resolution and AWS	3
2.1 Background to the WCPFC climate Resolution.....	3
2.2 Analysis of the AWS in implementing the WCPFC climate resolution	3
3. Supporting policies required for the AWS	5
3.1 Collaboration between the WCPFC and IATTC.....	5
3.2 Supporting policies for data collection	5
3.3. National level supporting policies	6
4. Analysis of institutional roles and capacities	6
4.1 SPC and capacity needs.....	6
4.2 FFA and capacity needs.....	7
4.3 PNA Office and capacity needs.....	7
4.4 IATTC and capacity needs.....	7
4.5 The WCPFC and capacity needs	8
5. Financial analysis and needs	8
6. Recommendations for finance mechanisms and policies to support the AWS and relevant technology	11
6.1. Potential innovative finance mechanisms	12
6.1 Loss and damage	12
7. Next steps to realise the long-term financial and policy sustainability of the AWS	13
<i>High Level Panel for Sustainable Ocean Economy. 2022. Ocean Finance: Financing the Transition to a Sustainable Ocean Economy</i>	<i>18</i>
Appendix A. Institutional arrangements to support the AWS	19
The WCPFC.....	19
The Pacific Islands Forum Fisheries Agency	20
The Pacific Community	20
Parties to the Nauru Agreement.....	21
Other relevant parties and declarations	21
Appendix B.: WCPFC Climate resolution	23
Appendix C People consulted as part of this study	25
Appendix D Table assessing the ease of implementation of the different finance mechanisms	26
Climate insurance mechanisms	27
The Blue Economy and impact investment.....	27

Innovative debt mechanisms	28
<i>Appendix E. Assessment of the innovative finance mechanisms.....</i>	<i>36</i>

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List of Acronyms and abbreviations

AWS	Advance Warning System
COP	Conference of Parties
EEZ(s)	Exclusive economic zone(s)
ENSO	El Nino Southern Oscillation
FAD(s)	Fish aggregating device(s)
FAO	Food and Agriculture Organization (of the United Nations)
FAME	Fisheries, Aquaculture and Marine Ecosystems
FFA	Forum Fisheries Agency
FJD	Fijian dollar
FSM	Federated States of Micronesia
GCF	Green Climate Fund
IDF	International Development Finance
KI	Kiribati
LCD	Least Developed Countries
nm	Nautical mile
PNG	Papua New Guinea
PICs	Pacific Island countries
PICTs	Pacific Island countries and territories
PNA	Parties to the Nauru Agreement
RMI	Republic of Marshal Islands
RFP	Request for proposals
SI	Solomon Islands
SIDS	Small Island Developing States
SDG	Sustainable Development Goals
SPC	Pacific Community
SME	Small medium enterprise
SST	Sea surface temperature
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States dollar
VDS	Vessel Day Scheme
WB	World Bank
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean
WHO	World Health Organisation

1. Objectives and main tasks of AWS

Climate change is adversely affecting the Western and Central Pacific Ocean (WCPO) large marine ecosystem, degrading its coral reefs and changing the distribution of important fisheries species. The impacts on coral reefs are reducing the supply of reef fish and threatening the food security of more than four million people that live along the coasts of the RTP's targeted 14 Pacific Island countries.⁶ The redistribution of tuna will have profound implications for national economies that derive as much as 70% of their (non-aid) government revenue from tuna fishing, thereby dramatically reducing basic social services that are essential to the resilience of Pacific Island people. The RTP will 1) increase supply of tuna for domestic consumption as an adaptation to degradation of coral reefs and the resulting food insecurity for vulnerable populations; and 2) usher in the reforms needed to minimise the risks for citizens of countries with economies that are vulnerable to climate-driven redistribution of tuna.

The RTP comprises two components. Component A⁷ is being designed to support adaptations to harness tuna for food security of Pacific Island communities as coral reefs are degraded by climate change. This component addresses the need to improve food security of vulnerable communities by increasing access to tuna through empowering small-scale fishers to progressively transfer their fishing effort from coral reefs to tuna as well as and securing better access to tuna for rapidly-growing urban communities from industrial fishing operations. Importantly, these interventions will also ensure that coastal communities are equipped with the training and technology needed to fish around FADs safely and effectively. They will build the capacity of national fisheries administrations and coastal communities to prepare for and respond to climate-related natural disasters, and support fishers and communities to access local markets and add value to catches. Sustainable financing and supporting policy considerations associated with this Component are addressed in separate reports.

Component B⁸ addresses the need to manage the risks to national economies, and the vulnerable populations who depend on public spending, associated with shifting tuna populations by providing reliable information on the extent and timing of climate-driven redistribution of tuna. This will be achieved through the development of an 'advance warning system' (AWS) for tuna-dependent economies to predict nearer-term changes in the distribution of tuna across the tropical Pacific Ocean, including robust forecasts in 1–10-year timeframes, in addition to longer-term projections in the 30–50-year range.

Development of the AWS centres around a new paradigm for reducing uncertainty in assessing the likely effects of ocean warming on tuna by integrating climate impacts into models of tuna populations (stocks) used to understand the impact of fishing on stock dynamics (ie; for the first time assess the combined impacts of fishing and climate change). By scaling to spatial resolutions of 1 degree or higher and applying a full ensemble approach the AWS will allow Pacific Island

⁶ Bell, J.D., Senina, I., Adams, T., Aumont, O., Calmettes, B., Clark, S., Dessert, M., Gehlen, M., Gorgues, T., Hampton, J. and Hanich, Q. 2021. Pathways to sustaining tuna-dependent Pacific Island economies during climate change. *Nature sustainability*, 4(10), pp.900-910.

⁷ Component A. Adaptations to harness tuna for food security of Pacific Island communities as coral reefs are degraded by climate change.

⁸ Adaptations to reduce risks to Pacific Island economies from climate-driven tuna redistribution.

Countries (PICs) participating in the program to identify adaptations that capitalise on any projected changes in abundance of tuna in their waters with greater confidence.

The Pacific Community (SPC), which is the science provider to the Western and Central Pacific Fisheries Commission (WCPFC), is best suited to be the main implementing agency of the AWS as it currently has the research infrastructure, technical capability and access to confidential fisheries information necessary for development of the AWS. SPC will need to further develop its scientific capability to support improved climate modelling and predictions, drawing from a range of inter-related initiatives that will include:

- (i) Collection of tissue samples from tuna across the Western and Central Pacific Ocean (WCPO) and Eastern Pacific Ocean (EPO), in collaboration with industrial fishing companies, for use in genetic population analyses to benchmark the population size and connectivity of all skipjack, yellowfin, bigeye and albacore populations of tuna in the Pacific Ocean tuna;
- (ii) Analysis of genetic samples to produce resource maps showing the number and distribution of all stocks comprising each species of tuna within their range in the tropical and subtropical Pacific Ocean;
- (iii) Tuna tagging programmes to verify the distribution, size and behaviour of all identified tuna stocks (in collaboration with the Inter-American Tropical Tuna Commission, IATTC);
- (iv) Launching the AWS by integrating the projected effects of climate change on each tuna stock to produce robust assessments of the recommended sustainable catch from the WCPO expected to be caught in the Exclusive Economic Zones (EEZs) of Pacific Island countries, and in high seas areas, on a regular basis in the decades ahead; and
- (v) Collaborations with industrial fishing companies operating in the WCPO to collect data on sea surface temperatures and ocean current velocities to inform and validate global climate models. Acoustic data will also need to be collected to assess responses of tuna prey to climate change to improve models predicting the responses of tuna species to ocean warming. These collaborations will identify appropriate protocols for use of these data.

The AWS will also need participation by the Pacific Islands Forum Fisheries Agency (FFA) to build fleet dynamics models that project future fishing effort to conduct improved economic impact analysis based on the climate model's projections of tuna movements and availability in the EEZ of the PICs and the high seas. This information will support PICs in negotiating tuna management measures both regionally and internationally, with the goal of retaining income in line with historical catches of tuna taken in their waters.

This analysis describes the institutional framework and capacity to support the AWS beyond the lifetime of the GCF-funded program as well as the current policy framework and future needs that will support its implementation. The financial and capacity needs that are required after the initial 7 years to ensure the financial sustainability of the program are assessed. Recommendations relating to candidate finance mechanisms and arrangements to support the program financially into the future are included.

A full description of the institutions and the arrangements between them relevant to the AWS is included in Appendix 1.

2. Analysis of the WCPFC climate resolution and AWS

2.1 Background to the WCPFC climate Resolution

The WCPFC 2019 Resolution⁹ on climate change (see Appendix 2; hereafter Resolution 2019-01) is the first declaration of its kind to address the inter-related issues of climate change and WCPO fisheries. It is one of the few agreed to date by RFMOs.¹⁰

The WCPFC Resolution was prompted by a delegation proposal from the FFA members to the regular WCPFC session in December 2019. The FFA's paper brought to the Commission's attention a Pacific Islands Forum Leaders' declaration from August 2019 declaring the need for urgent climate action.¹¹ The issues put forward by FFA members are all broadly reflected in the five points of the WCPFC Resolution, although it did not become a binding Conservation and Management Measure (CMM). FFA's proposal to reduce the carbon footprint of fishing activities was worded in diplomatically acceptable terms in the final WCPFC Resolution (point 4).

2.2 Analysis of the AWS in implementing the WCPFC climate resolution

The WCPFC climate change Resolution has not, to date, been implemented through a clear action plan. However, at the 2022 WCPFC meeting it was agreed that annual updates on the climate Resolution will be a standing item on the Commission's agenda. It will also be considered in the meetings of WCPFC subsidiary bodies. The AWS will support the practical application of Resolution 2019-01, as set out below:

Resolution point 1:

Consider the potential impacts of climate change on highly migratory fish stocks in the Convention Area and any related impacts on the economies of CCMs and food security and livelihoods of their people, in particular Small Islands Developing States and Participating Territories.

The AWS will provide an important platform to contribute to on-going initiatives to understand the short- and medium-term impacts of climate change on Pacific tuna stocks. Together with the economic modelling conducted by the FFA, this will support PICs to optimise the benefits associated with the use of those resources that are not compromised as a consequence of redistribution of tuna biomass. The AWS will support PICs in the negotiations in WCPFC for the allocation of fishing rights on the high seas areas and via other relevant international fora such as UNFSA and UNFCCC, as required.

The capacity building component of the AWS programme will promote regional solidarity and enhance negotiating skills to secure long-term benefits from the contribution of tuna to their national economies that are not less than historical contributions.

The AWS will also guide other adaptations relevant to SIDS livelihoods and food security. For example, adaptations to capitalise on any opportunities arising from redistribution of tuna into the EEZs of subtropical PICs. Opportunities may include investments in infrastructure to ensure

⁹ [WCPFC climate resolution](#)

¹⁰ At its annual session in 2022, ICCAT adopted the "Resolution by ICCAT on Climate Change" and at its 101st Meeting in August 2023, IATTC adopted a climate resolution (C-23-10).

¹¹ [Kainaki II Declaration 2019](#).

food security and distribution of bycatch from industrial operations in an efficient manner as per other parts of this proposal (see Technical Study 5 relating to transshipment by-catch study).¹²

Resolution point 2:

Support further development of science on the relationship between climate change and target stocks, non-target species, and species belonging to the same ecosystem or dependent on or associated with the target stocks, as well as interrelationships with other factors that affect these stocks and species and estimates of the associated uncertainties.

SPC as the science services provider to WCPFC and the principal partner in the AWS initiative, will be the primary source of information and advice for this component of the Resolution through current and improved ocean modelling and tuna stock assessment activities. SPC's science work has supported the development of the SEAPODYM model to assess the ocean-basin-scale effects of climate change on the distribution and abundance of tuna. The proposed additional inputs for this model within the AWS include protocols to transition current fisheries and ocean monitoring activities to include approaches that facilitate assessment at the EEZ and higher resolution (e.g. molecular approaches) to verify the absolute abundance and connectivity of stocks and stock assessment models that can be used to develop indicators for climate-driven redistribution of tuna. The existing modelling expertise, and additional data to be collected, lay a firm foundation for building an AWS based on information that is robust for applying improved versions of the SEAPODYM model to each stock at finer spatial resolution for projection and forecasting purposes. The data collection and models produced by SEAPODYM will also feed into international climate models and improve the accuracy of global efforts related to understanding climate-induced impacts on fish stocks and their ocean ecosystems.

Resolution point 3:

Take into account in its deliberations, including in the development of conservation and management measures, scientific information available from the Scientific Committee on the potential impacts of climate change on target stocks, non-target species, and species belonging to the same ecosystem or dependent on or associated with the target stocks.

The AWS contributes to this point of Resolution 2019-01 by strengthening the scientific information and modelling that will be available to the WCPFC Scientific Committee to advise the Commission on the impacts of climate change of the WCPO ecosystem.

Resolution point 4:

Consider how climate change and fishing activities may be related and address any potential impacts in a manner consistent with the Convention.

The improved ability to monitor and respond to changes in the distribution of tuna at the regional level with information from the AWS will enable countries to plan to secure the essential economic benefits they receive from the region's most valuable natural resource. The forecasts and projections that will be available through the AWS will also assist PICs and other WCPFC members to develop more efficient fishing operations and, in so doing, minimise greenhouse gas emissions.

Resolution point 5:

¹² SPC 2023, *SPC fame technical studies*. Accessed November 2023. <https://fame.spc.int/technical-studies-support-funding-proposal-green-climate-fund-regional-tuna-programme>

Consider options to reduce the environmental impacts of the Commission related to headquarters operation and meetings of the Commission and its subsidiary bodies.

This is not relevant to the AWS, but rather to standard operating practices of the Commission and the subsidiary bodies.

3. Supporting policies required for the AWS

The AWS will become an important tool for the region to support the development of adaptive fisheries management policies and approaches. However, there are some supporting frameworks and policies that should be further analysed and, if necessary, strengthened to ensure effective and collaborative operation of the AWS.

3.1 Collaboration between the WCPFC and IATTC

The WCPFC and IATTC are two overlapping management bodies that effectively share the management of the same large-scale ecosystem. There is already an official overlap area, which the Commissions jointly manage. In addition, there is an MOU of collaboration that covers other aspects of both Commissions' work, such as joint research activities, data sharing, proactive information sharing about their respective work and collaboration on management measures.¹³ For the purposes of the AWS and collection of oceanographic, tagging and genetic samples, this MOU already covers these needs and no further policies are needed at this time.

For the purposes of adaptive regional management within the WCPFC and IATTC and retaining the economic benefits of tuna for the PICs as the fish redistribute eastwards (including redistribution into the high seas of the IATTC jurisdiction), more comprehensive collaboration and policy reforms may be needed (refer to Study 8).¹⁴

3.2 Supporting policies for data collection

The WCPFC climate Resolution already mandates that the membership of WCPFC support scientific data collection and other efforts to achieve increased and more accurate scientific understanding of climate change impacts on the sustainability and management of tuna stocks. As the AWS data collection will require long-term collaboration with industrial tuna fishing fleets for the collection of oceanographic and acoustic data and tuna tissue samples, it may be necessary to arrange for more specific obligations under the climate Resolution that require fleets to collaborate adequately. Oceanographic data collected from industrial tuna vessels can also be used to reduce their energy consumption and carbon footprint by 25%.¹⁵ Mandating vessel instrumentation and application in data collection obligations would also contribute to meeting Resolution 2019-01 point 4 on mitigation.

Obligations for data collection can also be mandated under national licensing and through the organisations that oversee and/or negotiate sub-regional access arrangements. Historically, this has also been an influential pathway for WCPFC CMM adoption. A number of important WCPFC CMMs have been based on arrangements implemented by the PNA for their collective EEZs as part of their licensing requirements, before they were adopted by the WCPFC for all fleets operating throughout the Convention Area.

¹³ [WCPFC – IATTC MOU](#)

¹⁴ SPC 2023, *SPC fame technical studies*. Accessed November 2023. <https://fame.spc.int/technical-studies-support-funding-proposal-green-climate-fund-regional-tuna-programme>

¹⁵ [SusTunTech 2023. Sustainable tuna fisheries through earth observation technologies, Accessed June 2023. https://www.sustuntech.eu/](#)

The WCPFC manages a Regional Observer Programme (ROP)¹⁶ and the PICs National Observer Programs contribute to this. WCPFC CMM's currently required 100% observer coverage on purse seine vessels operating in the WCPFC and a minimum of 5% for longline vessels. Data collection needs for the AWS are not currently specified in the "minimum data fields" of the ROP. An assessment should be undertaken to assess whether additional data fields and/or activities need to be mandated under the ROP to support the AWS.

3.3. National level supporting policies

National consultations conducted in support of this Study (February-April 2023) did not identify any major requirements in terms of supporting policies needed to operationalise the AWS in the region. Issues raised mainly concerned governance arrangements between SPC and the RTP member countries, as well as the preferred balance of activities between gaining new knowledge, projections (>15 years), forecasting (<10 years) and capacity building for enhanced negotiating power. An agreed governance arrangement will need to be developed to ensure the AWS meets the expectations of the GCF project member countries as their priorities change over time.

There is also the need to socialise the modelling results at all levels of national administrations to ensure they are properly understood and utilised. The contribution of FFA to the economic aspect of the modelling is considered to be essential, given the significance of the economic impacts predicted, and the PICs need for informed financial forecasting.

Although not a supporting policy as such, the long-term success of the AWS in the region will also require capacity building and integration into national data collection activities. There are already many national level initiatives that can assist the long-term data needs of the AWS and vice versa. Some of the relevant points brought up at the consultations in regard to harnessing opportunities to build national capacity to contribute to the AWS were:¹⁷

- (i) Foster collaboration between local research institutions and AWS developers;
- (ii) Capacity building for staff and fishers on the AWS;
- (iii) Short-term accredited courses (stock assessment, harvest strategy, climate change and resilience, biological sampling/genetic sampling, fish economic workshops);
- (iv) Training of fisheries data collection staff and national observers in the collection of data that goes into the AWS;
- (v) Assist in the review of current oceanic fisheries structure to accommodate national implementation of project activities;
- (vi) Assist in data gap analysis for oceanic fisheries;
- (vii) Inconsistent data monitoring (artisanal)
- (viii) Strengthening existing data system
- (ix) Weather buoy tracking
- (x) E-reporting (ER)

4. Analysis of institutional roles and capacities

4.1 SPC and capacity needs

The largest long-term capacity needs in maintaining the AWS into the future lies with the SPC as the scientific services provider for the 14 participating countries as well as the WCPFC. The

¹⁶ [WCPFC Regional Observer Programme](#)

¹⁷ The below list is a direct copy paste from the summary consultation notes.

responsibility to maintain the AWS system beyond the GCF project period is expected to remain with SPC while it fulfils the role of scientific services provider.

The implementation of Component B of the RFP will develop additional data collection, analysis, and modelling capability as well as capacity to interpret results and develop practical management advice and predictions. These increased responsibilities bring with them increased demand for management and administrative oversight. In addition, there will be a need for further outreach and communication to effectively communicate the results of the AWS with project partners and PICs.

The long-term roles that will need to be maintained beyond the lifetime of the GCF project are a priority and are identified in the budget post project funding (Table 1). These include additional analytical capacity for specimen sampling, data collection and analysis.

4.2 FFA and capacity needs

FFA has recently added in-house climate change expertise to its permanent fisheries advisory and policy outreach roles supporting the August 2023 adoption of their Climate Change Strategy. These roles will provide national-level advice and capacity building for the PICs as well as using the results of the AWS in international fora, such as the UNFCCC. These roles are currently funded through the regular financing channels of the FFA with additional support falling under the GCF at the start of the programme.¹⁸

FFA will require additional fisheries advisory and climate policy outreach capacity within its existing economic analysis team to conduct the necessary economic modelling to support implementation of the AWS. Any additional short-term needs arising from the AWS could be outsourced to contractors on an as-need basis.

4.3 PNA Office and capacity needs

No additional staff needs are identified for the PNA Office (PNAO) and their role in providing regular fisheries management advice can simply take information from the AWS into consideration during decision making. The FFA will additionally be providing economic advice that will cover the interests and needs of the PNA membership. It is envisaged that any ad hoc needs by PNA and its membership that may arise from the AWS can be outsourced to contractors on an as-need basis.¹⁹

4.4 IATTC and capacity needs

Unlike the WCPFC, which has outsourced its scientific tasks for the SPC, the IATTC has an in-house science unit. The scientific work of the IATTC is funded through its member contributions, as per [Resolution C-15-05](#). Their main collaborative components that are aligned with the AWS are their tuna-tagging program and their Regional Observer Programme. These tagging cruises are not fully funded through the core funding of the IATTC, requiring additional grants to cover costs. At present, 30% of the tuna tagging budget of the IATTC is covered by the annual membership contributions. To cover the entire budget of the tagging programme, 70% of the funds come from programme specific funding (currently provided through a grant from the EU). Although there are regular staff who manage and execute the tagging, the tag return collection, data management

¹⁸ As per discussions with Chris Reed and Simon Nicol during consultations

This matter has yet to be discussed in detail with the PNAO.²⁰ The Pacific Forum Fisheries Agency (2022). Economic and development indicators and statistics: Tuna fisheries of the Western and Central Pacific Ocean 2022.

and some of the analysis, the additional grant budget includes funds for a quantitative modeller. According to the IATTC, these budgets will also be available in the future given the importance of the tagging programme for the scientific work of the Commission.

The same observer coverage requirements are mandated for the IATTC Regional Observer Programme as those for the WCPFC ROP. Similarly to WCPFC, although IATTC observers routinely collect specimen samples and oceanographic information while undertaking their duties these tasks are not mandated as a minimum data requirement.

Ongoing tuna tagging, data sharing and analysis from the Eastern Pacific Ocean will be required for the AWS. However, there are no additional needs for the IATTC over and above its core operations and funding (including existing grant requirements for the tagging cruises). It is also estimated that the IATTC's long-term capacity needs will remain approximately the same despite the development of the AWS.

Other areas of scientific collaboration between WCPFC and IATTC based on AWS-related activities include joint assessments for stocks such as South Pacific albacore and biological investigations, particularly in relation to bigeye and yellowfin tuna.

4.5 The WCPFC and capacity needs

The scientific advisory role of the WCPFC is performed by its Scientific Committee with SPC serving as its scientific services provider. WCPFC provides its Scientific Committee with an annual budget to support data collection and curation, stock assessment and tuna-related research and analytics. These activities will support the AWS. Depending on the ultimate design and execution of the AWS, the WCPFC may need to support policy work around the industrial vessel sampling protocols and associated industry liaison. The responsibilities for this could be assigned to the WCPFC Secretariat (coordination, legal etc.) and are not envisaged to necessitate additional resources to support the AWS.

5. Financial analysis and needs

The full financial analysis, including the draft budget for the 7-year RTP, supported program, external contributions from the regular donors to the various agencies to the AWS as well as the post-RTP budget including the predicted funding gap post RTP investment (= total budget – expected external support) is provided as Appendix A.

Due to the many ongoing funded supportive roles by the regional agencies that will contribute to the AWS activities (explained in Chapter 4), the long-term funding gap beyond the RTP is not expected to be large. At current exchange rates, the funding gap for the first year following the RTP is expected to be USD925,000, increasing to USD1,041,000 by year 5 after the program (Table 1) and USD1,207,000 for year 10.

The largest annual financial needs will lie with the FFA Secretariat's climate-related staff costs that will be around USD580,000 in the first year after the RTP. Staff costs for SPC will be USD295,000 in the first year, with an additional USD50,000 in staff time needed per year for the tagging programme (Table 1).

Table 1: Annual funding gap to continue to develop and operate the AWS following the RTP, based on current projections and an estimated 3% annual increase in costs.

Budget item	Year 7 GCF	Year 7 external	Funding gap at the end of RTPme	Funding need year 2 post GCF	Funding need Year 3 post GCF	Funding need Year 4 post GCF	Funding need year 5 post GCF
SPC staff costs							
SEAPODYM modelling ⁵	700,000	215,000	235,000	242,050	249,312	256,791	264,495
Management /model launch ⁶			-	-	-	-	-
Oceanographic data collection (WCPO/EPO) ³	200,000		-	-	-	-	-
Pacific Tuna Tagging Programme staff cost (WCPFC) ²		450,000	50,000	51,500	53,045	54,636	56,275
Tuna tissue sampling (Pacific Marine Specimen Bank) ¹	275,000	380,000	30,000	30,900	31,827	32,782	33,765
Genetic and connectivity analysis ⁴	1,100,000	380,000	30,000	30,900	31,827	32,782	33,765
FFA staff costs							
FFA economic analysis	190,000		190,000	195,700	201,571	207,618	213,847
FFA International negotiations (IATTC/UNFCCC)	200,000		200,000	206,000	212,180	218,545	225,102
FFA Fisheries management advice integration	190,000		190,000	195,700	201,571	207,618	213,847
Activities and assets							

Pacific Tuna Tagging Programme (WCPFC)		950,000	-	-	-	-	-	
Pacific Marine Specimen Bank (WCPFC)		340,000	-	-	-	-	-	
Tuna Tagging Programme (IATTC)		1,330,737	-	-	-	-	-	
Total:	2,855,000	0	4,045,737	925,000	952,750	981,333	1,010,772	1,041,096

- 1=SPC programme resources supporting PMSB staff (supervisor and technician)
- 2=SPC programme and other project resources (supporting supervising scientist, data manager & technician)
- 3=likely PCCOS external contribution (but \$ amount to be determined)
- 4=SPC programme support for molecular scientist and technician
- 5=SPC programme support for 1 modeller
- 6=WCPFC and SPC support for MSE team

6. Recommendations for finance mechanisms and policies to support the AWS and relevant technology

The long-term maintenance costs of the AWS after the initial 7-year period are not large overall, at approximately USD925,000 annually. The current annual value of tuna fisheries to the region is 5 billion USD.²⁰ The predicted cost of the AWS is just 0.01-0.02% annually of this value at current rates and therefore there is a strong case to be made for the region's administrations (including WCPFC) being able to cover this cost as part of their annual budgets. This is especially true as the AWS will try to understand the scale and speed of the climate threat to the economic value of the fishery. There is good justification for the Fisheries and Finance Ministries of the PICs, as well as the national/international fishing industry, to invest in R&D as part of their annual budgets that supports AWS. As a comparison, large enterprises annually spend at least 3% of their income on R&D.

Options for funding this include adding the additional roles and resources to the standard operating budgets (donors of SPC and FFA) or existing co-financing arrangements, or incorporating them within the cost recovery mechanism and budgets of the RMFOs themselves.

Resolution 2019-01 provides a good basis for the additional costs arising from the AWS to be included in the Commission's operational budget supported by the WCPFC membership through annual contributions. The case for this payment model is especially strong given that the AWS will also generate benefits for the industrial fishing sector by providing information that industry can use to make long-term investment and operational decisions.

There is evidence from other regions suggesting that improved use of scientific instrumentation and forecasting will allow for fuel cost savings of up to 25%.²¹ It is important that these benefits are quantified and conveyed as justification for long-term financial and data provision support from industry during the RTP. FFA and SPC can include the range of likely benefits for the industry and assess industry's capacity to contribute to the AWS, under the different climate scenarios, through their collective bioeconomic modelling work for the duration of the RTP. The funding could be done indirectly, through the Commission, or directly with industry through a cost recovery mechanism (see recommendations for more details).

Similarly, for the IATTC the justification for member support for critical scientific advice that impacts the short, medium and long-term investment and operations landscape provides strong justification for financial support from IATTC to the AWS, particularly as climate impacts and predictions for the IATTC/WCPFC overlap area will be included in AWS assessments.

²⁰ The Pacific Forum Fisheries Agency (2022). Economic and development indicators and statistics: Tuna fisheries in the Western and Central Pacific Ocean 2022.

²¹ [SusTunTech 2023. Sustainable tuna fisheries through earth observation technologies, Accessed June 2023. https://www.sustuntech.eu/](https://www.sustuntech.eu/)

A summary of additional long-term finance possibilities for the AWS is presented below. These funding mechanisms might provide additional financial support for Component B of the RTP, especially if unforeseen circumstances impact regular grant and donor-based funding sources or the cost recovery and other existing finance mechanisms as outlined above do not materialise.

6.1. Potential innovative finance mechanisms

In addition to cost recovery options and other traditional bilateral and multilateral funding²² there are a number of new innovative finance mechanisms being developed that can support ocean-related climate adaptation and mitigation. These usually involve the private sector and new methods of gauging the assessment of climate impacts and/or offsets.

Given the cost recovery mechanisms are most likely to deliver immediate finance at the end of year 7 (or earlier) these should be prioritised during the RTP. Other potential finance mechanisms assessed are included in Appendix E. The finance mechanisms described in Appendix E are long-term aspirational and innovative mechanisms that, in most cases, are being developed “outside of the AWS immediate needs” that do not directly relate to but offer potential for synergies. Data generated by the AWS will be valuable in developing some of these finance mechanisms.

6.2 Loss and damage

There is increasing international recognition that the current ambitions for climate adaptation and mitigation may not be effective for managing the consequences of climate change and that developing countries, in particular may suffer huge damage and losses due to increased climate impacts. The Warsaw International Mechanism for Loss and Damage associated with climate change impacts (WIM) was established at the COP19 in 2013. The Paris Agreement further underlined the importance of this issue. All Parties are requested to develop and implement concrete and effective climate risk management instruments and measures to avert, minimise, or – when the limits of adaptation are reached – effectively address residual loss and damage caused by climate-related extreme events and slow onset changes. The loss and damage discussions under the UNFCCC have been somewhat controversial and became the main focus of the negotiations at the COP27 in 2022 in Egypt, where developed nations pledged an additional USD 230 million for the adaptation fund, although this is still seen as widely insufficient.²³

Given the already severe impacts of climate change being felt in the Pacific region, PICs and SIDDs

²² There are a number of global initiatives which are dedicated to ocean including the World Bank Problue, and The ADB Ocean health programme²² which are important donors for fisheries management in the region.

²³ United Nations Climate Change 2022, COP27 reaches breakthrough on new loss and damage fund for vulnerable countries. Accessed June 2023. <https://unfccc.int/news/cop27-reaches-breakthrough-agreement-on-new-loss-and-damage-fund-for-vulnerable-countries>.

in general are likely to be leading many of the negotiations on loss and damage and compensation processes to do with slow onset events and extreme weather events. Loss and damage to Pacific tuna and reef fisheries is likely to fall into the category of slow onset events, unless marine heat waves or other extreme events cause large, widespread and sudden damage. According to the UNFCCC loss and damage guidelines²⁴ there is a need for Parties to pursue ocean and fisheries-based mitigation and adaptation strategies as a first step, as the loss and damage fund is for unavoidable damage.

Should the WCPFC/IATTC negotiation pathway fail in agreeing to share the tuna resources in a way that does not disadvantage the PICs, or be too slow to implement, then the loss and damage option becomes a reality for tuna fisheries compensation, and the AWS can play a key role in quantifying the scale, speed and severity of the loss and damage. There is of course nothing stopping the region from pursuing these strategies in parallel and using the loss and damage pathway as leverage to drive progress in the RFMO negotiations. Funding for the AWS could be sought to support loss and damage negotiations given the key role it will play in quantifying the loss and damage suffered, however given the likely speed of these negotiations it should not be relied upon as a primary source of funding for the AWS.

Given the PICs are already very active in the UNFCCC loss and damage discussions, this finance avenue does not require extra capacity, the negotiators simply need to be informed of the AWS, its role, importance and cost considerations. The timelines with this finance are however unpredictable and as such it should not be depended upon as a sole source of finance for the AWS.

7. Next steps to realise the long-term financial and policy sustainability of the AWS

Based on the likelihood of success and ease of implementation it is recommended that industry contributions and cost recovery options are explored in the first instance as sources of long-term finance for the AWS (see Table 2). The basic steps needed to explore industry contribution and cost recovery options under the GCF grant are outlined below.

- ***Ensure the finance ministries of the PICs are investing part of their annual fishery related income to R&D activities that contribute to the AWS.*** This will help provide a long-term financing basis for AWS activities.
- ***Explore the willingness of the fishing industry to provide sampling support for the AWS.*** If it is difficult to obtain necessary scale through voluntary participation, explore the opportunity to introduce a CMM at the WCPFC under Resolution 2019-01 that mandates vessel owners to contribute to the AWS to gain better understanding of climate impacts on the WCPO tuna stocks.

²⁴ United Nations Climate Change 2018, *Annual Report*, Accessed June 2023.
<https://unfccc.int/sites/default/files/resource/UN-Climate-Change-Annual-Report-2018.pdf>

- Alternatively, or in addition to the above, *explore the possibility of the PNA including sampling support to the AWS as a requirement under the vessel licensing conditions of the VDS.*
- As the AWS is implemented and the total number of vessels, different data collection instruments and other parameters are defined and operationalised, it will become possible to measure fuel efficiency and other benefits to industry in detail. For example, improved Internet connection will support the distribution of AWS outputs to assist more efficient fishing operations by more accurate and timely forecasting of tuna movements which can improve fishing efficiency. Once these benefits have been quantified, it will be possible to *conduct a detailed cost benefit analysis and based on that propose a long-term industry contribution model.*
- Once the details of the onboard instrumentation, data collection tasks and time requirements are more defined, it will be possible to *properly evaluate the role of fishery observers in the AWS related data collection.* Depending on their ability to contribute, and the extent of the tasks, there may be relevant policy changes to the existing observer regulations and protocols to enable them to collect the required information.
- Depending on the feasibility and successful implementation of the industry (and observer program) support model, or in parallel, explore the cost recovery options of the WCPFC to maintain the AWS. Once the program is designed and the cost benefit thoroughly assessed, the role of the Commission in providing on-going support for the AWS should be considered. The functions of the AWS to support WCPFC Resolution 2019-01 and its implementation should be considered as core business of the WCPFC and be covered by the long-term contributions from its Members.
- Once the cost benefit analyses are clearer, *relevant fishing industry bodies can also be approached for cost share contributions to AWS related costs,* given they also receive direct benefit. As an alternative to fees through PNA licensing conditions (see above), the national purse seine associations of the fishing nations could be approached for cost recovery payments based agreements and contributions.

Other more innovative finance options that can also be explored simultaneously. Such possibilities are summarised below (more detail in Appendix E).

1) ***Parametric climate insurance:*** National FAD programs and other small-scale fishery operations impacted by climate change in the region can potentially to benefit from parametric climate insurance. To promote this, an insurance broker is required to undertake a feasibility assessment and design exercise. There are on-going projects in the region in parametric insurance design for

small-scale fisheries already where some lessons can be learned and replicated.^{25 26} If the data requirements for insurance can utilise data from the AWS, there is potential that some of the long-term costs of the AWS can be included in the insurance financial model.

2) **Blue economy and impact investment:** As climate adaptation and mitigation actions in the region intensify and finance is sought for new or renovated infrastructure and other assets, the potential for incorporating AWS-related components in these new investments should be explored. Depending on the objectives of the instruments there may also be scope for the AWS to provide monitoring data that supports the impact evaluation of these investments.

3) **Debt instruments and debt swaps:** As debt instruments and debt swaps are explored in the Pacific, either nationally or as part of regional initiatives, there is a possibility that area, ecosystem and/or species-based conservation outcomes may be required as a pre-condition for funding support. These are often geared towards meeting SDG, Paris Agreement and general sustainability and climate related objectives. AWS-derived outcomes can be applied to monitor the impacts of such agreements and provide data for both the development and maintenance of these instruments.

4) **Loss and damage:** The AWS will provide critical data to support the negotiation process through various fora (WCPFC, UNFCCC, IATTC and related regional and international forums) for equitable outcomes for PICs to secure the income from tuna based on historical catches in their EEZs. The AWS has the potential to play a key role in quantifying the scale, speed and severity of the loss and damage. As part of the loss and damage process adequate funding to support the AWS should be negotiated given the key role of AWS-derived data and modelling in quantifying the spatial and temporal loss and damage.

A rapid assessment of the policy support options as well as the two main financial approaches that are most likely to succeed in the PIC context given the limited implementation window of the RTP 1) industry support, 2) cost recovery finance mechanisms available to cover the AWS long-term finance needs are presented in Table 2. In addition, a table assessing the ease of implementation of the innovative finance mechanisms introduced above in in Appendix D. These mechanisms should be pursued parallel to the other more likely cost recovery mechanisms and not relied upon alone. They are subjectively ranked from easy to difficult according to ease of implementation and likelihood of success. It is anticipated that a ranking of “easy” could be implemented within a year or two, “moderate” 2+ years and “difficult” 3+ years of design and

²⁵ WWF Pacific 2021. Safeguarding Melanesian fishing communities against climate threats. Accessed June 2023. <https://www.wwfpacific.org/?369375/Safeguarding-Melanesian-fishing-communities-against-Climate-threats>

²⁶ WWF Pacific 2021. Safeguarding Melanesian fishing communities against climate threats. Accessed June 2023. <https://www.wwfpacific.org/?369375/Safeguarding-Melanesian-fishing-communities-against-Climate-threats>

negotiations. Other criteria used are additional expertise required (low, moderate, and high levels) and the level of innovation/risk (low, moderate and high levels).

In addition, other mechanisms that could also be explored include national sovereign wealth funds and trust funds such as the Niue New Ocean Commitment Trust Fund.²⁷ However, given the amount of funding support required is relatively modest, these alternative sources would only need to be explored if all other efforts were unsuccessful.

Table 2: Ranking on the ease of implementation of the supporting policy and finance mechanisms.

Intervention	Ease of implementation		
	Likely time line	Additional expertise required	Innovation/risk
WCPFC CMM requiring industry sampling support for AWS	moderate	low	low
PNA licensing requirement for industry sampling support	easy	low	low
WCPFC and IATTC collaboration on scientific data collection and sharing	easy	low	low
WCPFC ROP to support AWS sampling efforts	easy	low	low
Long-term integration of AWS activities to PIC national science and innovation initiatives	moderate	moderate	low
Finance mechanism			
National R&D budgets	easy	Low	low
Cost recovery through WCPFC/IATCC membership fees	moderate	low	low
Cost recovery through direct	easy	low	low

²⁷ See study 9: Part 1. FAD report.

industry financial contributions			
UNFCCC loss and damage payments	difficult	High	moderate

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Appendix A. Institutional arrangements to support the AWS

The WCPFC

The WCPFC is the responsible fisheries management and conservation body for highly migratory fish stocks in the West and Central Pacific Ocean (WCPO). It was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention), which entered into force on 19 June 2004.

The WCPF Convention draws on many of the provisions of the UN Fish Stocks Agreement (UNFSA) while, at the same time, reflecting the unique political, socio-economic, cultural, geographical and environmental characteristics of the WCPO region. The Convention incorporates social as well as fisheries management objectives. In particular, it recognises the ecological and geographical vulnerability of the many Small Island Developing States (SIDS) within the Convention Area, the economic and social dependence they have on migratory fish stocks, as well as their need for special scientific, and technological assistance.²⁸

The WCPFC Convention Area differs from other RFMOs in that much of the tuna under its jurisdiction migrates across the EEZs of the PICs. Particularly prominent among the management principles of the Convention is the principle of compatibility, which provides that the decisions of the Commission for the high seas and the measures adopted by Coastal States for areas under national jurisdiction shall be compatible in order to ensure conservation and management of highly migratory stocks in their entirety.²⁹

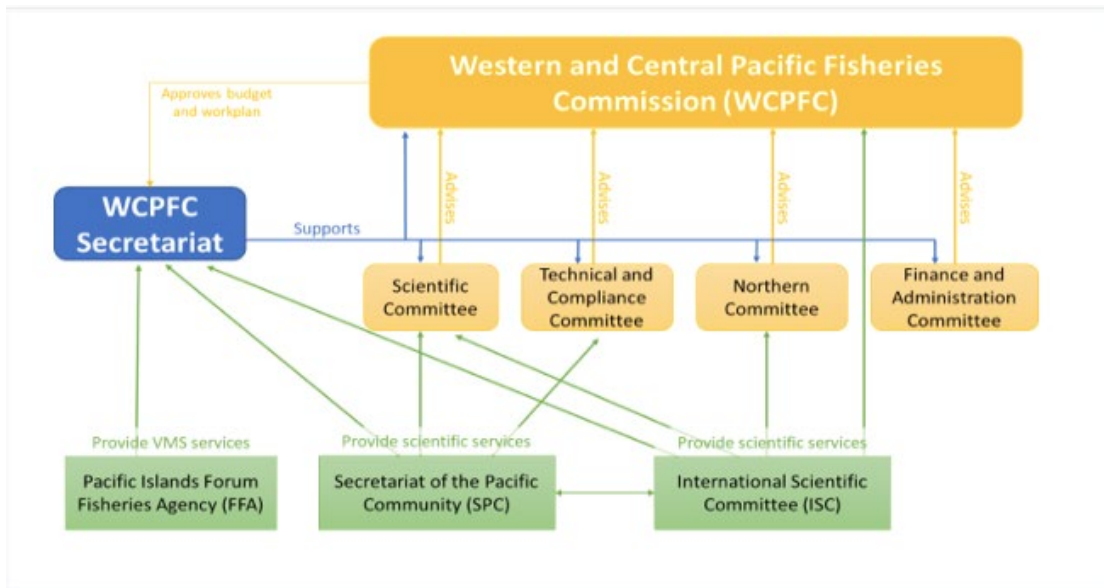
The Commission supports three technical subsidiary bodies, the Scientific Committee, the Technical and Compliance Committee and the the Northern Committee, which each meet annually. The subsidiary body meetings are followed by a full session of the Commission in December each year. The work of the Commission is assisted by a Finance and Administration Committee³⁰ and numerous ad hoc working groups convened to address specific technical issues before the Commission. The Scientific Committee requires ocean modelling and stock assessments and the AWS will contribute to its work through SPC as further explained below.

The below diagram illustrates the relationship between the Commission, its subsidiary bodies, its Secretariat and three other regional institutions, of which two, the Pacific Community (SPC) and the Pacific Islands Forum Fisheries Agency (FFA), are key partners in the proposed AWS.

²⁸ [WCPFC institutional review](#)

²⁹ [WCPFC institutional review](#)

³⁰ [WCPFC](#)



(Image from WCPFC 2022)

The Pacific Islands Forum Fisheries Agency

While the WCPFC is tasked with the management of the high seas in the Convention Area there are other bodies that coordinate the PICs management approaches and ensure the compatibility requirement of Article 5 of the Convention is met. The FFA was established in 1979 with the mission to facilitate regional cooperation so that all Pacific countries benefit from the sustainable use of tuna. The FFA supports its member countries to sustainably manage the fishery resources that fall within their 200-nautical mile EEZs. The FFA is an advisory body providing expertise, technical assistance and other support to its members who make sovereign decisions about their tuna resources and participate in regional decision-making on tuna management through agencies such as the WCPFC. The capacities of the FFA also include fisheries management, fisheries development and economic analysis and sustainable investment advice to its members as well as the provision of climate advice and support to its members engaged in international negotiations.³¹ Compliance monitoring and support for the engagement of FFA members in WCPFC are important components of FFA’s work programme.

The Pacific Community

The Pacific Community (SPC) is an international development organisation that operates regionally with 22 member countries and territories. SPC’s vision for the region is a secure and prosperous Pacific Community whose people are educated and healthy and manage their resources in a sustainable way. The SPC Oceanic Fisheries Program (OFP) was established in 1980 and is the regional centre for tuna fisheries research, fishery monitoring, stock assessment and

³¹ FFA interview 2023

data management. The OFP is the contracted Science Service and Data Management Provider to WCPFC.

The programme of work for SPC's Division of Fisheries, Aquaculture and Marine Ecosystems (FAME), under which the OFP operates, includes climate and marine ecosystems-related assessments, advice and capacity building.³² This institutional framework will ensure that AWS-related activity is integrated to the broader programme of work of SPC and that AWS initiatives will be sustained within SPC beyond the life of the GCF project.

Parties to the Nauru Agreement

The Nauru Agreement Concerning Cooperation in the Management of Fisheries of Common Interest, or The Nauru Agreement, is an Oceania subregional agreement between FSM, Kiribati, RMI, Nauru, Palau, PNG, Solomon Islands and Tuvalu.

Historically, the Nauru Agreement and other joint fishery management arrangements made by the Parties to the Nauru Agreement (usually referred to as PNA) have been concerned mainly with the management of the tuna purse seine fishing in the tropical western Pacific.

The PNA Vessel Day Scheme (VDS) supplies 95% of tuna caught in the region.³³ The PNA membership overlaps with that of the FFA, and there is a high-level alignment between the management advice and approaches that maximises the economic benefits of the PNA members and helps meet the sustainability requirements of the WCPFC. Improved ocean modelling provided by the AWS will assist PNA in meeting its objective of sustained economic benefit from the sustainably managed tuna resources for its membership.

Other relevant parties and declarations

As seen from the above institutional arrangements, the AWS will be well institutionalised within SPC which sits within the WCPFC framework to support the long-term work of the Commission in sustainably and fairly managing the highly migratory fish stock in the high seas, and in support of the WCPFC climate resolution (see section 2). In addition, the AWS will build resilience to climate change by supporting the following important management frameworks, strategies and resolutions for the fisheries sector and the region more broadly:

- The Pacific Island Forum Leaders declarations and initiatives, including the recently adopted Blue Pacific Continent 2050 strategy³⁴ that includes actions associated with climate change and resilience as well as economic development and fisheries goals.
- The *Regional Roadmap for Sustainable Pacific Fisheries*,³⁵ designed in 2015 to improve sustainability of tuna resources, add value to tuna catches, increase employment, and provide better access to tuna for food security, as well as building resilience of coastal

³² [SPC Oceanic Fisheries](#)

³³ [PNA](#)

³⁴ [2050 strategy](#)

³⁵ [FFA roadmap](#)

habitats (by progressively shifting fishing effort from coral reefs to tuna); the roadmap will be reviewed and renewed in the coming years.

- *A New Song for Coastal Fisheries – Pathways for Change*,³⁶ provides an innovative regional approach to maintain the benefits of small-scale fisheries in the face of declining coastal ecosystems and associated fish stocks.
- FFA Climate Strategy adopted by the Forum Fisheries Committee in August 2023.

In addition, the AWS will contribute towards the PICs implementation of their Nationally Determined Contributions (NDCs) under the Paris Agreement. Ten of the 14 participating countries in the RTP have included a need for support for adaptations to the effects of climate change on the ocean and coastal marine habitats in their NDCs.³⁷

[The Noumea Strategy](#)

³⁷Gallo, N., Victor, G. and Levin, L. 2017. Ocean Commitments under Paris Agreement. *Nature Climate Change*, 7.

https://www.researchgate.net/publication/320721251_Ocean_commitments_under_the_Paris_Agreement

Appendix B.: WCPFC Climate resolution

COMMISSION SIXTEENTH REGULAR SESSION

Port Moresby, Papua New Guinea

5 –11 December 2019

RESOLUTION ON CLIMATE CHANGE AS IT RELATES TO THE WESTERN AND CENTRAL PACIFIC FISHERIES COMMISSION

Resolution 2019-01

The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean,

RECOGNISING international initiatives to address the impacts of climate change including through the United Nations Framework Convention on Climate Change; NOTING the work of the Intergovernmental Panel on Climate Change;

MINDFUL of the work of the Scientific Services Provider to the Commission in assessing the impacts of climate change on target stocks and non-target species, and species belonging to the same ecosystem or dependent or associated with the target stocks in the Convention Area;

NOTING that Pacific Islands Forum Leaders reaffirmed at their meeting in August 2019 that climate change is the single greatest threat to the livelihoods, security and wellbeing of the peoples of the Pacific and their commitment to progress the implementation of the Paris Agreement;

FURTHER NOTING the Kainaki II Declaration for Urgent Climate Change Action Now made by Pacific Islands Forum Leaders in August 2019;

NOTING the importance of addressing the potential impacts of climate change and other environmental degradation on target stocks, non-target species, and species belonging to the same ecosystem or dependent or associated with the target stocks in the Convention Area;

NOTING the objective of the Convention to ensure, through effective management, the long term conservation and sustainable use of highly migratory fish stocks in the Western and Central Pacific Ocean in accordance with the 1982 Convention and the 1995 United Nations Fish Stocks Agreement;

Resolves to:

1. Consider the potential impacts of climate change on highly migratory fish stocks in the Convention Area and any related impacts on the economies of CCMs and food security and livelihoods of their people, in particular Small Islands Developing States and Participating Territories.
2. Support further development of science on the relationship between climate change and target stocks, non-target species, and species belonging to the same ecosystem or dependent on or associated with the target stocks, as well as interrelationships with other factors that affect these stocks and species, and estimates of the associated uncertainties.
3. Take into account in its deliberations, including in the development of conservation and management measures, scientific information available from the Scientific Committee on the potential impacts of climate change on target stocks, non-target species, and species belonging to the same ecosystem or dependent on or associated with the target stocks.
4. Consider how climate change and fishing activities may be related and address any potential impacts in a manner consistent with the Convention.
5. Consider options to reduce the environmental impacts of the Commission related to headquarters operation and meetings of the Commission and its subsidiary

Appendix C. People consulted as part of this study

Name	Institution
Simon Nicol	SPC
Ludwig Kumorou	SPC
Chris Reid	FFA
Jale Samuwai	FFA
Daniel Fuller	IATTC
Alexander Aires-de-silva	IATTC
Camille Goodman	Wollongong University
Josean Fernandez	AZTI

Appendix D. Table assessing the ease of implementation of the different finance mechanisms

Intervention	Ease of implementation		
	Likely timeline	Additional expertise required	Innovation/risk
National R&D budgets	easy	Low	low
Cost recovery through WCPFC/IATCC membership fees	moderate	low	low
Cost recovery through direct industry financial contributions	easy	low	low
Climate insurance as part of long-term finance model	moderate	high	high
Impact investment based finance mechanism	moderate	high	moderate
Innovative debt instruments as part of finance mechanism	difficult	high	high
UNFCCC Loss and damage payments	difficult	High	moderate

Appendix E. Innovative finance mechanisms assessed

Climate insurance mechanisms

There are various climate insurance products and approaches under development to meet the needs of increasing climate-related perils. As mentioned in the FAD finance mechanisms and supporting policies report, parametric insurance products are becoming popular for areas that are otherwise difficult to insure. This type of insurance provides for payments based on a set of pre-agreed, independently verified, metrics such as wind speed, rainfall, wave height and other weather-related phenomena. c. With appropriate policies in place, payments are triggered when a threshold pre-agreed metrics are met or exceeded' rather than needing evidence of damage. An example of this mechanism is the Caribbean Catastrophic Risk Insurance Facility funded by the World Bank, the EU and others donors as well as member countries fees, operating in the Caribbeans to insure governments against natural disasters. The availability of insurance is also used in debt-based transactions to reduce risks to private investors in addition to other risk reductions measures such as bank guarantees.

The AWS has the potential to provide a source of independent data for various oceanographic metrics. If this was successfully established long-term data collection and analysis costs associated with the AWS could be included in the insurance product.

Climate insurance is a new and experimental area of work and should this approach be developed as part of funding other climate adaptation measures (the FAD programs) it will require dedicated people with relevant insurance experience to develop. The FAD fisheries already include much data and relevant information but some additional data collection and modelling exercises may need to be conducted as well that require time, budget and expertise. This may take several years to complete within the RTP and a minimum of 200,000 USD of budget and much more if separate insurance products are developed per country.

The Blue Economy and impact investment

As opposed to traditional investments that seek to maximise financial returns, impact investments are made with the intention of generating positive, measurable social and environmental impact in addition to a financial return. Impact investments are possible in both emerging and developed markets and target a range of returns depending on investors' strategic goals and priorities.

Increasingly, blue economy investments are emerging in marine and ocean sectors that contribute positive impacts to areas such as sustainable fisheries, technology, marine protected area finance and eco-tourism.

Impact investments often require a sufficient scale of at least USD 1 million although scales of at least 5-10 million USD are preferable. Therefore, developing suitable investment targets requires some work and in the context of PIC's tuna fisheries climate adaptation needs and many smaller

investments may need to be aggregated into one larger investment pipeline for feasibility. One such investment has been recently made in Fiji by Matanataki Ltd, a development and finance partnerships, which connects local entrepreneurs and projects in coral reefs conservation and blue economy with impact investors using blended finance. The partnership raised USD 75 million in investments³⁸ under which several small enterprises receive investment.

There is broad scope for impact investment in climate mitigation, adaptation and marine conservation initiatives in the Pacific. It will require the right kind of entrepreneurial approach and likely at least some expert support from conservation and financial experts to identify and structure these deals and their desired conservation and social impacts. This is also noted under the FAD section of the report.

The blue economy is defined as the sustainable and equitable development of the ocean³⁹ and whilst it is a large is a collection of investments and instruments to do with investing in the ocean and related sustainable economies, there is significant potential for sustainable finance that could contribute to the support of the AWS and the broader programme of climate adaptation and mitigation initiatives associated with tuna fisheries in the region. The FFA Secretariat has expertise in innovative finance capacity which could be applied to identify and develop suitable impact investment opportunities.

As an example, with respect to the AWS, a green port upgrade strategy to meet sustainability, environmental and climate requirement could include investment in the storage and laboratory facilities required for tissue sample analysis. Instrumentation on board the vessels collecting AWS-related data could measure the CO₂ efficiency and mitigation targets of industrial fishing vessels. Such provisions could be a pre-condition for impact investment finance.

The impact investment approach will require dedicated capacity in identifying and structuring the deals as well as ensuring the impact of these investments is meeting the required outcomes. It may also take some work to identify not just the investment need but a capable private sector actor able to receive the investment. These may be large multinational operations in case of the investments related to the AWS. Early in the RTP, a dedicated team or at least some persons that leverage other regional programs working on this issue if impact investments are going to support the long-term finance options.

Innovative debt mechanisms

Blue Bonds are tradable fixed income financial instruments that are designed to support the protection and sustainable use of oceans including fisheries projects. The World Bank defines Blue Bonds as *“a debt instrument issued by governments, development banks or others to raise capital*

³⁸ [Matanaki](#)

³⁹ High Level Panel for Sustainable Ocean Economy 2022, Ocean Finance, Accessed November 2023. <https://oceanpanel.org/publication/ocean-finance-financing-the-transition-to-a-sustainable-ocean-economy/>

*from impact investors to finance marine and ocean-based projects that have positive environmental, economic and climate benefits”.*⁴⁰

Seychelles was the first country to issue a sovereign Blue Bond in 2018 with support from a WB guarantee and a GEF concessional loan. The initiative raised USD 15 million from three impact investors. The Proceeds from the Blue Bond were disbursed as grants (3 million) and loans (12 million) and were used to support the design and management of sustainable use marine protected areas under the Seychelles MSP, and a transitioning to sustainable artisanal fisheries, complementing the WB Third South West Indian Ocean Fisheries Governance and Shared Growth Programme (SWIOFISH 3) and contributing to the Seychelles blue economy.⁴¹

The Nordic Investment Bank (NIB) launched a 5-year SEK 2 billion Nordic–Baltic Blue Bond to support banks that are lending to selected water management and protection projects in the Baltic Sea.⁴² In addition, to draw attention to plastic waste pollution in oceans, the World Bank launched a Blue Bond in April 2019. This scalable step-up fixed rate bond, which was targeted at both institutional and individual investors, raised USD 10 million. The Bank of China issued Blue Bonds in November 2020. The dual-currency bond raised the equivalent of USD 942 million towards investments in initiatives to protect the oceans.⁴³ This was the first Blue Bond from the private sector, the first from a commercial bank and the first from Asia.

The Nature Conservancy (TNC), a US based NGO has been engaging with countries on the conservation of marine ecosystems using debt-for-nature swaps. In 2015, with the support of TNC, the Government of Seychelles negotiated a 21.6 million debt-for-nature swap with the club of Paris for ocean conservation. The Government of Seychelles established the Conservation and Climate Adaptation Trust (SeyCCAT) to administer debt repayments and the proceeds of the debt swap, including the designation of 30% of its EEZ as MPAs and the development of Seychelle MSP. Annual small grant finance has been disbursed for fisheries, conservation and marine research projects. A more recent SIDS debt conversion example is from 2021 in Belize ‘Blue Bonds’ where the government of Belize purchased part of its debt at a favourable discount rate with the support of TNC and credit Suisse.

Although PICs will undoubtedly consider Blue & Green Bonds and debt-for-nature-swaps in the coming years, the question remains how to best leverage these funds to support fisheries, oceans and climate adaptation and mitigation and if debt based approaches that are adding burden to

⁴⁰ Nasdag 2021, *What are blue bonds?* Accessed June 2023. <https://www.nasdaq.com/articles/what-are-blue-bonds-2021-08-04>

⁴¹ World Bank 2018, *Seychelles launches world’s first sovereign blue bond.* Accessed June 2023. <https://www.worldbank.org/en/news/press-release/2018/10/29/seychelles-launches-worlds-first-sovereign-blue-bond>

⁴² Nasdag 2021, *What are blue bonds?* Accessed June 2023. <https://www.nasdaq.com/articles/what-are-blue-bonds-2021-08-04>

⁴³ Bank of China 2020, *attestation report on the issuance of blue bonds.* Accessed June 2023. <https://pic.bankofchina.com/bocappd/report/202104/P020210430614087906599.pdf>

already indebted nations is the right long-term approach and will require caution.⁴⁴ Good standards of governance, transparency with wide stakeholder consultations for the processes will be required as the lack of them has caused issues in previous debt-for-nature-swaps.⁴⁵ Close cooperation will be required between countries and agencies across the Pacific region to develop these mechanisms and to assess the possibility of including programmes like the AWS in the support offered/broader investments made.

These investment structures are large and take a long time to develop, structure and find suitable investment targets. This is a huge amount of work by different actors ranging from governments, the investors themselves and other players such as NGOs who find and develop suitable investment opportunities. The RTP should work closely with the Pacific Island's Forum (PIF), leading the assessments on the suitability of these instruments for the PICs in general and keeping the financial needs and outcomes of the AWS in the frame.

⁴⁴ Abeta R (2021) The Blue Pacific Ocean Report

https://www.academia.edu/49332201/Blue_Pacific_Ocean_Report_2021

⁴⁵ CFFA 2023. Gabon's odious debt-for-ocean swapt. The implications for ocean governance. Accessed November 2023. <https://www.cffacape.org/publications-blog/gabon-debt-ocean-swap-tnc?rq=Gabon>