CLIPSSA Project
Pacific Climate Local Knowledge and Adaptation Strategies

KEY CLIMATE KNOWLEDGE FOR THE PACIFIC

Region	French Overseas Territories of the South Pacific: New Caledonia, Wallis and Futuna and French Polynesia Vanuatu
Members institutions	French Development Agency French National Research Institute for Sustainable Development Météo-France
Type of funding	Research agreement (Overseas Fund 2050 Facility)
Result area	**Climate change and public policy adaptation.** • Most vulnerable people, communities and region • Health, agriculture, water, energy
Amount	3 851 598 €
Project duration	3,5 years Semester 2, 2021 to Semester 1, 2025

EXECUTIVE SUMMARY FOR DECISION-MAKERS
CLIPSSA Project
Pacific Climate Local Knowledge and Adaptation Strategies

Context

On the front line of climate change, the South Pacific island states and territories are at the forefront of the fight against climate change because of their high exposure and vulnerability to the region's diverse weather patterns. As part of their climate change mitigation and adaptation plans, Pacific island territories repeatedly express their need to acquire general knowledge about the future climate, particularly for managing their water, energy and food resources, and public health and biodiversity issues.

Project objectives

CLIPSSA is a regional project that aims to develop new scientific data on the future climate of the South Pacific (by 2100) to analyse sectoral impacts and local knowledge and adaptation practices already existing in each territory. It is essential to facilitate the formulation of adaptation and mitigation strategies and the development of action and adaptation plans in the face of climate change in Wallis and Futuna, French Polynesia, New Caledonia and Vanuatu.

Main activities of the project

- Production of high-resolution climate simulations for the entire South Pacific (on ~20km grid cells) to better understand the future of the Pacific climate in terms of heat waves, precipitation, droughts and cyclone activity;
- Production of very high resolution simulations (~2km grid cells) for three specific time windows for the next 100 years: the near (~2040), medium (2060) and far (~2080) future in various climate scenarios including the Paris Agreement.
- Updating climate change data from IPCC[1] models and national priorities for key climate-impacted sectors;
- Development of databases gathering local knowledge and practices constituting the "risk cultures" of the populations living on these islands, i.e. non-confidential knowledge and know-how beneficial for promoting adaptation to extreme phenomena;
- Analysis of the transformations that have affected the places and times of transmission of knowledge and valuable know-howfor adaptation;
- Implementation of a climate portal website;
- Support for the development or updating of strategies for adaptation to climate change, based in particular on local knowledge, and for their promotion among the population.

Institutional set-ups and arrangements

This transdisciplinary (natural sciences, humanities and social sciences) action-research project (decision-makers) is being conducted by AFD, IRD and Météo-France, combining and pooling their technical and financial resources through an innovative multi-partner approach.

[1] Intergovernmental Panel on Climate Change

SUMMARY

1. CONTEXT AND ISSUES

A. Scientific background

The South Pacific comprises of myriad islands divided into three sub-regions (Melanesia, Polynesia and Micronesia), embodying a plural Oceanic space thanks to its geographical diversity, a mosaic of populations and exceptional socio-economic and ecological wealth. The Pacific island states and territories contribute to the world's major ecological balances by possessing five of the thirty-six "global biodiversity hotspots", one of which is French Polynesia, which is preparing to create one of the largest marine protected areas, and the other New Caledonia, which possesses the world's largest continuous coral reef, classified as a UNESCO World Heritage Site.

Climatically, the South Pacific has a variety of climates ranging from the warm, rainy, year-round equatorial climate of the Solomon Islands to a tropical to subtropical climate with alternating hot and humid and cooler and drier seasons. This area is located on one of the most important convection zones on the planet, the South Pacific Convergence Zone (SPCZ), with direct consequences in terms of floods, droughts, heat waves and cyclones on the South Pacific islands. The SPCZ is a key component of cyclone formation and governs the freshwater resources of South Pacific island countries at the first order of magnitude. On interannual scales, the intensity and position of the SPCZ are dependent on key climate phenomena in the region such as the El Niño-Southern Oscillation (ENSO). The functioning of the SPCZ is difficult to understand because of the complex interactions that occur within it between the ocean and the atmosphere. International programmes, such as CLIVAR[2] to better understand the dynamics, interaction and predictability of the climate system have highlighted the complexity of the functioning of the SPCZ, which climate models generally simulate very poorly.

As a result of the SPCZ, Pacific Island States and Territories are profoundly affected by a number of weather and extreme events causing major socio-economic and ecological damage. With very uneven adaptive capacities, given the diversity of geographical, economic and social situations, and with various future changes in climatic events such as ENSO or extremes, the Pacific Island States and Territories are thus very vulnerable to the effects of climate change, even though they represent only 0.03% of global greenhouse gas (GHG) emissions.

B. Addressing current scientific gaps and barriers

It is noted that the global climate models, whose simulations have been used for decades as a basis for the IPCC reports, show, in the region, a strong disparity in the simulations of the SPCZ over the historical period (1970-2020) on the one hand, but also large uncertainties on its future positions and intensities (Brown et al., 2020) whatever the socio-economic scenario followed in the 21st century. These uncertainties carry over into the assessment of the future of key phenomena such as ENSO but also of extremes more generally (cyclones, heat waves, extreme rainfall events, droughts, etc.). While it is accepted that the frequency of cyclones will decrease in the region, but with a high degree of uncertainty according to the studies, the future of their intensity is still being debated (Dutheil et al., 2020; Dutheil, 2019; Walsh et al., 2012, 2016).

[2] (Climate and Ocean: Variability, Predictability and Change) is one of the six flagship projects of the World Climate Research Programme (WCRP). https://www.clivar.ord/

Finally, other extremes such as heat waves and temperature records are known to increase in the future (Power and Delage, 2019), but a reliable quantification of them remains to be estimated given the biases of models in the South Pacific and the diversity of possible future scenarios.

These uncertainties about the future of the South Pacific climate, in general, carry over to the island level and more particularly to the high islands such as New Caledonia, Vanuatu and French Polynesia due to the inadequacy of these models, which are coarse spatial gridded (~100km) and unable to reproduce many local phenomena resulting from interactions with the complex topography of the islands. For all these island territories, most climate models do not have a point of land at the location of the island territories. Therefore, they are not relevant for understanding the fate of the local climate and its impacts.

Thus there are no robust estimates of the fate of precipitation and drought at scales relevant to countries and territories under different scenarios over the next 100 years, nor the future of heat waves to slow climate trends. Yet the South Pacific islands are, for example, very vulnerable to the amount of precipitation that will dictate the availability of water resources.

All the uncertainties mentioned above raise the question of the reliability and relevance of climate projections in general in the South Pacific and the island states and territories scales in the current state of existing studies.

C. Regional and national climate change adaptation strategies

On the front line of climate change, the island states and territories of the South Pacific are experimental areas at the forefront of the fight against climate change due to their exposure and high vulnerability to weather phenomena.

As part of their adaptation and mitigation plans, the Pacific island territories repeatedly express their need to acquire general knowledge about the future climate, particularly for the managing their water, energy, and food resources and public health and biodiversity issues.

In order to adapt to these climate changes, it is necessary to know the future climate in detail, locally, to assess vulnerabilities and organise a coherent and structured response, i.e. changes in ways of doing things and living.

Action strategies, commonly known as National Adaptation Plans (NAPs), have already been carried out in many geographies, but this is not the case in the French Overseas Territories. The Wallis and Futuna adaptation strategy needs to be updated and translated into an action plan, and the Vanuatu adaptation plan is ancient.

In order to inform the adaptation strategies and plans of these island states and territories, a range of data, measures and potential investments that make societies more resilient to climate change is needed to be implemented.

2. PROJECT OBJECTIVES

The research-action project **Climate of the Pacific, Local Knowledge and Adaptation Strategies (CLIPSSA)** concerns the French overseas territories of the South Pacific (New Caledonia, Wallis and Futuna and French Polynesia) and Vanuatu.

The CLIPSSA project aims to:

- Characterise climate change and atmospheric hazards to better understand the future climate in the South Pacific in terms of ENSO, heatwaves, precipitation, drought and cyclonic activity between 2020 and 2100, using the latest global climate models. These future climate projections will be made at:
  - **(i)** High resolution (20km) at the scale of the entire South Pacific and
  - **(ii)** Very high resolution (2.5km) at the scale of the French overseas territories of the South Pacific and Vanuatu;
- Characterise the issues, vulnerabilities and potential of local resources and actors to analyse the future impact of climate change on key sectors to understand better the vulnerabilities linked to climate disruption and support the territories in developing their adaptation strategies;
- Identify, describe and analyse local knowledge through the study of:
  - **(i)** Feelings and experiences of the populations faced with these impacts, as well as the evolution of local knowledge mobilised to cope with extreme events which constitute "risk cultures",
  - **(ii)** Transmission of resistance and resilience levers of local systems;
- Support the updating and/or development of national climate change adaptation plans in the project territories;
- Set up a climate portal so that the climate data produced within the framework of the project is available on open access basis for local, national or regional institutions of the Pacific island states and territories as well as other actors (private sector, associations, etc.);
- Communicate and raise awareness of the importance of better management and adaptation of territories to climate change while capitalising, enhancing and sharing the scientific knowledge acquired during the project.

A summary diagram of the objectives is in Annex 1.

The regional CLIPSSA project aims to develop new scientific data on the future climate of the South Pacific (by 2100) under various IPCC climate scenarios, including that of the Paris Agreements, and analyse sectoral impacts local knowledge and adaptation practices already existing in each territory. It is an essential basis to facilitate the formulation of adaptation strategies and the development of adaptation action plans in response to climate change in Wallis and Futuna, French Polynesia, New Caledonia and Vanuatu.

On the one hand, the objectives of the CLIPSSA project are to strengthen the resilience of local communities in the face of climate change and, on the other hand, to ensure better collective ownership of changes in ways of doing things and living in the front of environmental transformations in the long term.

3. PROJECT ACTIVITIES

A. Climate simulations component (*implemented by IRD/Météo-France*)

Activity 1: Production of high-resolution future climate projections (20 km grid) over the entire South Pacific using simulations of several global (atmospheric) climate models from the latest IPCC report at different time scales: 'near' (2040), 'medium' (2070) and 'long' (2100).

This activity is based on the **recruitment of a postdoctoral climatologist** whose tasks are listed below.

Description of the activities	Deliverables
Year 1 – Semester 1, 2022	
Estimating of the possible length of simulations on the new Météo France (MF) computer to size the simulation periods (100 years, or some 30-year periods, etc.) and the number of reasonable simulations to test the sensitivity and uncertainties to forcing models.	**Deliverable A.1:** Report on the selection of climate models forcing the regional ALADIN model including their present and future behaviour. Number/Performance/Bias for the 2 scenarios
Characterization and selection of IPCC AR6 climate models (4-5 models) on their performance in the tropical Pacific (mean state, seasonal cycle, ENSO) for 2 scenarios: a priori SSP1-2.6 (Paris Agreement) and SSP5-8.5 (business as usual)	
Implementation of the 20km Pacific configuration in ALADIN with one way forcing with the ERA5 re-analysis (1979-2020)	**Deliverable A.2:** Report on the technical implementation of the ALADIN simulation at 20km. Calculation performance on new MF machine.
Year 1 – Semester 2, 2022	
Simulations on the present over the South Pacific in the ALADIN configuration at 20 km over the South Pacific 1979-2020 in ERA5. Test sensitivities on the model configuration/physics (e.g. convection, microphysics, PBL etc.) to get an idea of the most sensitive areas.	**Deliverable A.3:** Report on the ALADIN-ERA5 simulation at 20 km Pacific. Seasonal, interannual, cyclone cycle. Comparison with literature.
Elaboration of the methodology for correcting model biases (e.g. emergent stress methods etc.). Development of methodology for forcing future climates. Direct forcing, pseudo anomaly methods? Corrections of forcing climate models by these bias correction methods, on the present and future behaviour. Taking into account the uncertainties of forcing climates.	**Deliverable A.4:** Report on bias correction methods and future forcing methodology to consider uncertainties.
Year 2 – Semester 1, 2023	

Downscaling of 4-5 climate models on the present/future according to the chosen downscaling method (direct forcing, pseudo anomalies...) from 2020 to 2100 on 2 scenarios in ALADIN 20km. Taking into account the uncertainties according to the priority choices developed during year 1.	Production of scientific publications
Year 2 – Semester 2, 2023	
Analysis of the ALADIN 20km "future - present" simulations for the two scenarios in terms of seasonal, interannual and decadal variability and comparisons with forcing models.	**Deliverable A.5:** Report on the future climate in general in the ALADIN 20km simulations: - Production of scientific publications - Provision of data from the simulations, which will continue into the following year 2024 with the setting up of the portal.
Analysis of the "future - present" simulations for both scenarios in terms of extremes (precipitation, droughts, cyclones, heat waves), with an estimation of the uncertainties linked to the ALADIN climate/physics model.	

Activity 2: Production of future climate projections at very high resolution (2.5 km on a side) on island scales (New Caledonia/Vanuatu and Tahiti-Moorea) and statistical downscaling in Wallis and Futuna.

This activity is based on the following **recruitments**:

- A **6-month internship** for the configuration on regionalisation of climate in the South Pacific with ALADIN in present climate whose tasks are listed below.

Description of activities	Deliverables
Year 1 – 6 months	
Implementation of a 20km ALADIN configuration over the South Pacific during the 2010-2020 decade and validation using observations and models via different regional modelling configurations including the South Pacific Convergence Zone. At 20km, precipitation in this convergence zone is underestimated and poorly positioned. However, a new sub-mesh parametrisation configuration provides results that are more in line with reality.	**Deliverable B.0:** Regionalisation of climate in the South Pacific with ALADIN in the present climate.

- **A postdoctoral climatologist for 2 years** whose tasks are listed below.

Description of activities	Deliverables
Year 1 – Semester 2, 2022	
Implement of the 2.5km configuration over the Pacific in AROME with one way forcing with the ERA5 reanalysis (1990-2020 or 2000-2020 depending on MF computer performance) and ALADIN over NC-Vanuatu.	**Deliverable B.1:** Report on the technical implementation of the AROME 2.5km simulation in NC-Vanuatu

Or a shorter period depending on the estimated computation time and the Météo-France computation machines (a minimum of 15 years). Reflections on how to transmit the uncertainties of climate models to the local scale.	
Characterisation of the IPCC AR6 (4-5 models) and ALADIN/ERA5 climate models over French Polynesia (FP), New Caledonia (NC)-Vanuatu and Wallis and Futuna (WF) zoom areas. Comparison with the same IPCC AR5 models.	**Deliverable B.2:** Report on AR6 climate models over NC-Vanuatu, PF, WF and on the transmission of climate model uncertainty.
Implement of the 2.5km configuration over the Pacific in AROME with one way forcing with the ERA5 reanalysis (1990-2020 or 2000-2020 depending on WF computer performance) and ALADIN over FP. Or a shorter period depending on the computation time and the load of the estimated Météo-France computation machines (but minimum 15 years). Reflections on how to convey the uncertainties of climate models to the local scale.	**Deliverable B.3:** Report on the technical implementation of the AROME 2.5km simulation in PF.
Year 1 – Semester 1, 2023	
AROME-ERA5 and AROME-ALADIN 2.5km simulations over the FP (1990-2020 or shorter period ~20 years).	**Deliverable B.4:** Report on the comparisons between the two simulations. Analyzis of the past climate of the two simulations and gains with respect to ALADIN/ERA5. - First data available for post-doc Impacts
Year 2 – Semester 2, 2023	
AROME simulations at 2.5km over 3 periods of ~20 years centred on 2040, 2060 and 2080 in 2 SSP scenarios and taking into account the uncertainties previously decided to have estimates with uncertainties on FP.	**Deliverable B.5:** Maps showing the results of statistical downscaling of the future climate at WF from the ALADIN 20km simulations.
Statistical downscaling of ALADIN simulations of Postdoc1 on WF.	
Year 2 – Semester 1, 2024	
Analyzis of "future - present" simulations for both scenarios in terms of extremes (precipitation, droughts, cyclones, heat waves), with an estimation of uncertainties related to the climate/physics model.	**Deliverable B.6:** Report on the future climate in general in the AROME 2.5km simulations for FP - Production of scientific publication - Provision of simulation data to partners will continue over the next year on the distribution portals.

- A **3-year thesis** with the following tasks:

Description of activities	Deliverables
Year 1 – Semester 2, 2022	
Estimates of uncertainties in model physics, boundary conditions in ERA5/ALADIN and surface temperature sensitivity.	**Deliverable B.7:** Report on the mechanisms of extreme heat and rain events in AROME simulations over the present time - Provision of data for post-doctoral fellow Impacts
Simulations and analysis of AROME-ERA5/ALADIN-ERA5 simulations.	
Study of extreme events (e.g. heat waves, extreme precipitation events) - mechanisms on present climate.	
Year 2 - 2023	
AROME simulations and analyses at 2.5km for 3 periods of ~20 years centred on 2040, 2060 and 2080 in 2 SSP scenarios and propagating climate model uncertainties on FP.	**Deliverable B.8:** Report on future general climate change in FP - Beginning of analyses of extremes and attribution of variation in extremes to climate change
Year 3 - 2024	
Completion of future climate analyses, especially extremes with mechanisms and writing of the thesis.	**Deliverable B.9:** Maps showing all present and future simulations for the PF region.

2. Vulnerabilities and impact modelling component *(implemented by IRD)*

Activity 3: Analyse the future impact of climate change on specific sectors (to be defined with local authorities) such as energy, agriculture, health and/or biodiversity over different time scales.

This activity relies both on the mobilisation of private expertise for the realisation of consultation and concertation workshops in the project territories and the recruitment of **two post-doctoral fellows** whose tasks will be to model the impacts of climate disruption on key sectors, previously defined with the competent local authorities.

Description of activities	Deliverables
Year 1 - 2021	
Study of the existing documents concerning the impact studies already carried out in the target geographies and of the possible priority sectors to be studied in the impact models. Reflection on the setting up of consultation workshops with key actors in the countries to define the priority sectors.	**Deliverable C1:** Report on existing studies and possible priority areas.
Year 2 – Semester 1, 2022	
Setting up of consultation workshops with the key actors in the territories to define the	**Deliverable C2:** Holding of country and regional consultation workshops (5

priority sectors.	workshops, face-to-face or virtual)
	Deliverable C3: Report on the workshops and selection of priority areas for postdocs impacts.
Postdocs impacts Year 1 – Semester 2, 2022	
Creation of models linking climate (and its changes) and the chosen sectoral activity X during the consultation work with the authorities. The post-doctoral fellow will carry out this reflection in consultation with the SHS component. Reflection on the strategy to be adopted to take account of the uncertainties characterised in the climate simulations.	**Deliverable C.4:** Modelling strategy for all the project territories.
Year 2 – Semester 1, 2023	
Analyzis of the relationship between current climate and X impact. Statistical or dynamic modelling if possible linking key climate parameters to a sectoral index.	**Deliverable C.5:** Report on the sector impact model. Transmission of the code and the IT environment for its use.
Year 2 et 3 – Semester 2, 2023 and semester 1, 2024	
Projections of these statistical models on the future 2040, 2060, 2080 and in 2 scenarios with uncertainties using the country simulations created by the postdoc/thesis on the 2.5km simulations.	N/A
Creation of risk and vulnerability maps of the X-impact on the present and future for 2040, 2060, 2080 and 2 scenarios with uncertainties.	**Deliverable C.6:** Maps showing the impact of X on the present and future

3. Local knowledge and transmission modalities component *(implemented by IRD)*

Activity 4: Carry out activities to collect local knowledge (more specifically local ecological knowledge) constituting "risk cultures" in the project territories. Identify and analyse the knowledge and its transmission methods that can be used to promote adaptation to climate change.

The activity aims are to collect and describe local knowledge and know-how, in particular non-confidential knowledge about the environment (or local ecological knowledge) and to analyse the ways in which it is transmitted. This knowledge and know-how concerns both food production practices (fishing, agriculture, water supply) and those that enable people to predict and prepare for extreme weather events. They are based on knowledge relating to the functioning of ecosystems, changes in the environment and landscapes, and the repeated experience of the environment by each individual and each generation. This ecological knowledge, which is adjusted, transformed, created and incorporated into practices specific to each context in order to cope with environmental constraints, constitutes specific "risk cultures". They therefore form

a resource on which it is possible to draw in order to devise ways of adapting to large-scale environmental transformations and, in the long term, to strengthen the resilience of local communities in the face of climate change. As local populations are the first witnesses of environmental transformations in their territory, they are in a position to describe them and to raise the issues that these transformations imply in their daily lives. By being the first to be confronted with it, they are also the most likely to develop techniques to "accommodate" it. The aim of this activity is to describe, analyse and promote all of this knowledge in the different territories so that it can be used to support public policies aimed at increasing the resilience of populations to climate change. Integrating this knowledge will allow public policies to be better understood and more in line with the expectations and lifestyles of the populations concerned.

In order to select the sites where the experiences and knowledge will be described and analysed, this activity will be based on the expectations expressed locally, particularly by the communities of the project territories, and will take into account the results of the new climate projections made by the CLIPSSA team.

In sites selected for each island, the aim will be to:

1. Characterize the representations of climate change and the occurrence of extreme weather events experienced locally.
2. Describe and spatialize the knowledge and practices of food production that are used on a daily basis and their climatic ranges of validity, as well as the adjustments that the populations are used to making according to meteorological variations.
3. Identify those that are mobilised in times of environmental or socio-environmental crisis and understand how they are transmitted.
4. Analyse the impact of knowledge conveyed by school systems, scientists and various entities such as associations, NGOs, communities and the media on local knowledge and know-how and the ways in which they are transmitted.

This activity is carried out through the **recruitment of a 3-year PhD student targeting Vanuatu and New Caledonia and a 2-year post-doc for Wallis and Futuna and French Polynesia**. The tasks are listed below.

<table>
<tr><th>Description of activities</th><th>Deliverables</th></tr>
<tr><td colspan="2">Year 1 – Semester 2, 2021 and Semester 1, 2022</td></tr>
<tr><td>Analyzis of existing scientific literature in the humanities and social sciences.</td><td rowspan="4">Deliverable D.1: Initial review of the literature, synthesis of the first survey results.</td></tr>
<tr><td>Development of the survey methodology (cartographic supports, interview guides) in partnership with the project's modelling component. First field surveys on two identified sites.</td></tr>
<tr><td>Adjustment of the questions and methodology.</td></tr>
<tr><td>Sharing of the first results with the modelling teams of activities B and C and adjustment of the interview guides – questionnaires.</td></tr>
<tr><td colspan="2">Year 2 – Semester 2, 2022 and Semester 1, 2023</td></tr>
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In-depth field surveys in all sites (Vanuatu and NC by the PhD student / Wallis or French Polynesia by the post-doc).	**Deliverable D.2**: Report on the analysis of local socio-cultural issues in the face of the environmental transformations experienced in the different territories. **Deliverable D.3:** Presentation of the issues related to the integration of local ecological knowledge (levers/barriers; channels, etc.) in adaptation strategies and the means that can be mobilised to enhance them. **Deliverable D.4:** Annual progress report including a synthesis of the results acquired in each territory and an assessment of the ways in which certain local knowledge can be mobilised in adaptation strategies.
Analyzis of the data collected (interviews, maps).	
Production of a database on knowledge and an analysis of opportunities for integrating local knowledge into climate change adaptation strategies	
Year 3 – Semester 2, 202 and Semester 1, 2024	
In-depth field surveys in Wallis or Polynesia by the post-doctoral student (that which was not done during the previous year). Analyzis of collected data (interview, maps).	**Deliverable D.5:** detailed plan of the thesis. **Deliverable D.6:** Final reports presenting the main results for each territory: analyzis of the representations of environmental transformations and climate change and their impacts by the various actors, inventory and analysis of the local knowledge studied, evaluation of the ways in which certain local knowledge can be mobilised in adaptation strategies. **Deliverable D.7:** Restitution-debate in the pilot sites.
Structuring of all the results, writing of the doctoral thesis, writing of the four summary reports per territory.	

4. Climate Portal and adaptation strategies component *(AFD management with scientific support from IRD and Météo-France)*

Activity 5: Support for the adaptation plans of territories and countries to the effects of climate change.

Activity 6: Establishment of a dedicated website (in collaboration with SPREP) to make climate data freely available to local, national or regional institutions of the Pacific Island States and Territories as well as other stakeholders (private sector, associations, etc.)

5. Cross-cutting component – Coordination and communication *(implemented by AFD/IRD/MF)*

Activity 7: Project coordination

The project is coordinated by a Steering Committee and a Scientific Committee according to the following timetable. The purpose of the Steering Committee is to ensure the implementation of the project and the monitoring of the results. It is the forum for consultation between the Parties for the governance of the project. The Scientific Committee aims to monitor, comment and guide

the scientific results of the project. It is the forum for consultation between the direct and indirect partners for the scientific choices relating to the project.

A project engineer is recruited for the duration of the project, whose objectives are to ensure the animation and general coordination of the project, the steering and the administrative, budgetary and HR management of the project as well as the realisation of the communication and valorisation activities around the research work and the project results.

Coordination activities	Deliverables
Steering Committee (once or twice a year)	Report 2022, 2023, 2024
Scientific Committee (once a quarter)	Report 2022, 2023, 2024
Technical reports	• Interim reports (Year 2, semester 2, 2023) • Final reports (Year 3, semester 2, 2024)
Financial reports	

Activity 8: Communication activities

The communication objectives are as follows:

1. Inform decision-makers about the research objectives and expected results, to ensure the visibility of the project
2. Ensure the involvement and valorisation of the different local partners
3. Raise awareness of the project and the importance of better management and adaptation of territories to climate change
4. Capitalize, enhance, share and disseminate knowledge (project results)

Description of activities	Deliverables
Creation of a logo with graphic charter.	Deliverable E.1
Creation of a website to present CLIPSSA, the team, the main news and productions.	Deliverable E.2
Creation of brochures, films and press conferences.	Deliverable E.3
Realisation of 3 general assemblies of the project (virtual or face-to-face).	Deliverable E.4

4. EXPECTED OUTCOMES

The main outcomes of the project are as follows:

- ✓ High-resolution climate simulations for the entire South Pacific to better understand the future of the Pacific climate in terms of heat waves, precipitation, droughts and cyclone activity.
- ✓ Very high resolution simulations for three specific spatial windows (Vanuatu, New Caledonia and French Polynesia) as well as a statistical downscaling over Wallis and Futuna for the next 100 years.
- ✓ Updating climate change data from IPCC models and national priorities for key sectors impacted by climate. For example, for agriculture, the simulations will help answer the following questions: how will precipitation amounts and drought episodes evolve over

the next few decades? Do these changes pose a threat to agriculture? What changes in crops might this imply?

- ✓ Databases gathering local knowledge and practices constituting the "risk cultures" of the island societies of the project territories, i.e. non-confidential knowledge and know-how particularly useful for promoting adaptation to extreme phenomena.
- ✓ An analyzis of the transformations that have affected the places and times of transmission of knowledge and know-how useful for adaptation.
- ✓ The launch of a climate portal website.
- ✓ The promotion of climate change adaptation strategies among populations, based in particular on local environmental knowledge. Sectoral public policies could potentially be reviewed to integrate and anticipate these future risks.

Thanks to the new climate projections and qualitative surveys, the authorities will have better knowledge of, among other things:

- The evolution of precipitation and its uncertainties
- The evolution of heat waves and droughts
- The number and intensity of cyclones and other extreme events
- The impacts of climate change over a continuous time span between 2020 and 2100
- Local ecological knowledge and local lived realities around the effects and reduction of vulnerabilities to climate change.

5. INSTITUTIONAL SET-UP AND ARRANGEMENTS

The project is led by the French Development Agency (AFD), the French National Research Institute for Sustainable Development (IRD) and Météo-France (MF). The partnership that has been developed allows for the convergence and pooling of the resources of these institutions.

The IRD will manage part of the AFD funds through a research collaboration agreement signed between the IRD and AFD on July 8, 2021. The IRD has a dual-position by ensuring both the project management and the prime contractor for the project components in partnership with Météo-France. A research agreement between IRD and Météo-France setting out the conditions of collaboration for the implementation of CLIPSSA was signed on 24 February 2022.
The Climate Portal and Adaptation Strategies component will be implemented through funding agreements between AFD and SPREP and national/local authorities respectively.

A framework partnership agreement for the South Pacific between AFD, IRD and Météo-France was signed on 27 April 2022. Its aim is to achieve collaboration between the three institutions on issues related to climate change and disaster risk reduction in French Pacific island states and territories.

The CLIPSSA project aims to support an inclusive and sustainable regional cooperation of the French overseas territories of the South Pacific (New Caledonia, Wallis and Futuna, French Polynesia) and Vanuatu. Collaborations are planned through the Steering and Scientific Committees provided for in the project implementation and whose compositions are as follows:

Composition of the project committees	
Steering Committee	**Scientific Committee**
- A representative from Vanuatu; - A representative from New Caledonia; - A representative of Wallis and Futuna; - A representative of French Polynesia - A representative of French Polynesia; - A representative of AFD Noumea and/or Paris headquarters; - A representative of IRD Noumea and/or the headquarters in Marseille; - A representative of the New Caledonia and Wallis and Futuna Interregional Direction in and the French Polynesia Interregional Direction of Météo-France; A representative of the Climatology and Climatic Services Direction of Météo-France in Metropolitan France. - A representative of SPREP.	- AFD representatives from AFD's Innovation, Research and Knowledge Division and from the agency in Noumea; - Representatives from IRD Noumea and/or the headquarters in Marseille; - Representatives of Météo-France: New Caledonia and Wallis and Futuna Interregional Direction in and the French Polynesia Interregional Direction of Météo-France; A representative of the Climatology and Climate Services Direction of Météo-France in Metropolitan France; - A representative of SPREP.

The table in Annex 1 presents the different departments, directions and services involved in the implementation of the activities of each project component.

The following diagram shows the **institutional and technical organisation of the project**.

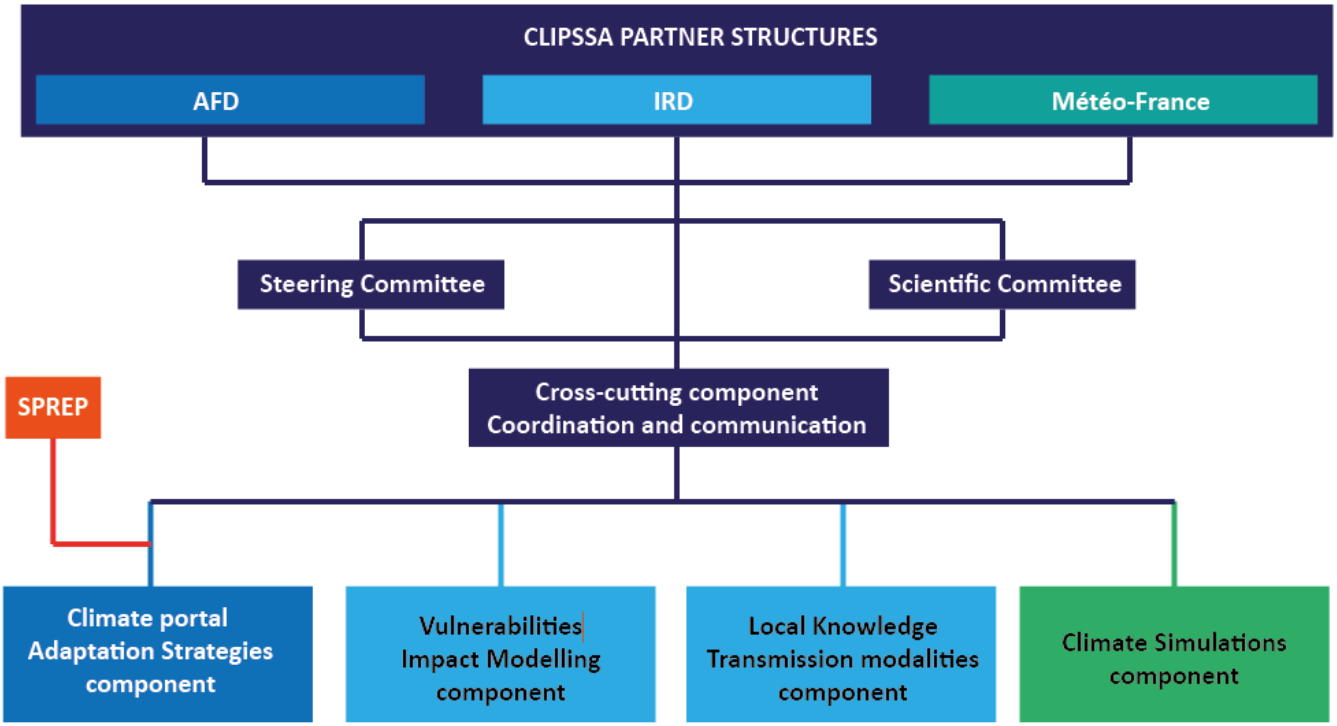


Diagram Legend:

AFD management in collaboration with SPREP
Technical management IRD
Technical management IRD/MF

6. MULTI-PARTNER APPROACH AND CONTRIBUTIONS TO PUBLIC POLICY

Regional and multi-partner scientific cooperation (Météo-France, IRD and other technical and scientific organisations).

Météo-France and IRD include in their contract of objectives the will to provide French territories with scientific knowledge leading to climate services that can be used by public authorities, i.e. on spatial scales relevant to the islands. A collaboration is set up through a multi-laboratory (UMR ENTROPIE, ESPACE-DEV, CNRM, CREDO) and multi-institute (IRD, AFD, MF-DCSC, DIRNC and DIRPF) team, Ifremer, universities (UPF, UNC), the German Institute (Warmenunde Institut) and the Oceanian Regional Program for the Environment (PROE/SPREP). The CLIPSSA project brings together biophysicists, oceanographers, meteorologists, geographers, anthropologists (more than 25 scientists and collaborators involved) from the Indo-Pacific region. The different research teams of the CLIPSSA project work together to ensure an efficient and effective synergy of scientific work.

- **Climate simulations**

The project reflects the desire of the New Caledonia and Wallis and Futuna Interregional Direction in and the French Polynesia Interregional Direction of Météo-France to deepen their knowledge of past and future climate change in order to develop, under the aegis of the Climatology and Climate Services Direction of Météo-France (DCSC-MF) in Metropolitan France. It will also consolidate partnerships with French scientific organisations in the South Pacific and promote the know-how of the Centre National de Recherches Météorologiques - Modélisation du Système Climatique régional (CNRM) in the Indo-Pacific region. The research project benefits from the technical expertise of the CNRM's MOSCA team (C. Caillaud, A. Alias) to set up an AROME configuration in climate mode and from the computing resources of Météo-France to carry out simulations of the present and future climate of this zone.

The FCPLR thesis in French Polynesia feeds the collaborations that exist between Météo-France New Caledonia, French Polynesia, IRD, and the University of French Polynesia (Marania Hopuare, Pascal Ortega). A long-standing collaboration exists between these researchers, who have worked particularly on rainfall variability on the Pacific islands through successive projects (VARAPP, PLUVAR) and now PACRES on renewable energy, financed by the Pacific Fund.

For more than three years, the French Polynesia Interregional Direction of Météo-France has been collaborating with Dr Keitapu Maamaatuaiahutapu, an oceanographer in the GEPASUD laboratory of the UPF and co-author of the latest version of the climatological atlas of French Polynesia. This collaboration has enabled us to supervise a research topic on the impact of climate change on extreme swells, to improve our knowledge of atmospheric dynamics and its variability on different time scales, which will help validate climate models, and to actively participate in the SPREP-sponsored Pacific Climate Change Monitor project, which aims to document long-term climate change in the tropical Pacific basin.

The simulations carried out with AROME within the framework of the FCPLR and the resulting impact models financed by the project will feed the climate services offered by Météo-France at the national level (DRIAS, ClimatHD) or locally in the project territories. Coordination with the DCSC at Météo-France and the other Overseas Directions will be sought when setting up the AROME simulations (period, scenario, variables). The availability of data will be shared in a regional effort to develop collaboration with the regional SPREP organisation.

At the regional level, Australia (CSIRO, Department of Foreign Affairs and Trade, BoM, USP, etc.) is also developing a research effort on climate regionalisation in the PICTS (Pacific Island Countries and Territories) of the South Pacific. Collaborations have already been established for a concerted effort. This innovative partnership dynamic enables the networking of research actors at the international, regional and local levels in the South Pacific basin.

- **Local knowledge and transmission methods**

Partnerships are planned with teams from other research organisations that are members of the Consortium for Research, Higher Education and Innovation in New Caledonia (CRESICA), such as the Caledonian Agronomic Institute (IAC) and the Centre for International Cooperation in Agricultural Research for Development (CIRAD). Other partnerships are envisaged on a local and regional scale with administrations (such as the Ministry of Education and Training in Vanuatu) and organisations working on research themes and the collection of knowledge, such as the Agence de Développement de la Culture Kanak (ADCK) in New Caledonia, the CRIOBE and the Rāhui Center in French Polynesia, as well as the Vanuatu Cultural Centre, the Vanuatu Kaljoral Senta (VKS). These exchanges will provide food for thought both in terms of the methodological aspects of knowledge gathering and the sharing of collected data.

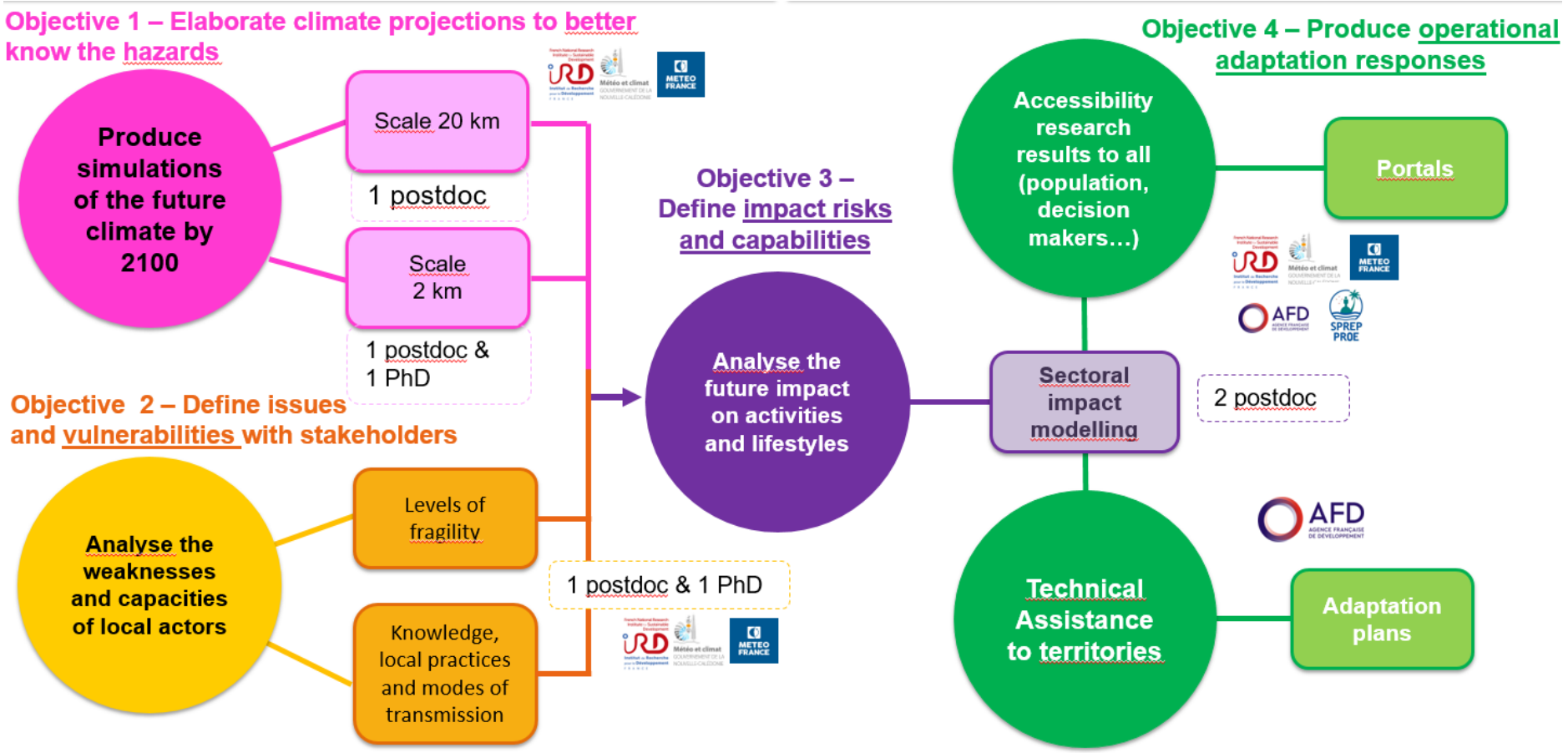
- **Public policies**

This project is in line with territorial public policies whose ultimate objective is to federate the efforts of the different stakeholders for an integrated management approach (adaptive and mitigation) at the appropriate island scales and to increase the knowledge capacities of the climate future and its impacts on key sectors. It aims to contribute to the improvement and implementation of several sectoral policies (climate, territorial integration and regional cooperation) through its interdisciplinary, intersectoral and inclusive nature. It aims to provide integrated knowledge that feeds ongoing projects and initiatives and makes it possible to become aware of the relationships that link them in terms of activities, territories and actors.

Finally, this regional project with the French Pacific territories and Vanuatu, New Caledonia's immediate neighbour and a long-standing partner of AFD, will strengthen the regional cooperation links that already exist in other areas such as education, health, culture and maritime surveillance with the New Caledonian and French governments.

<u>Contribution to the Sustainable Development Goals (SDGs/UN)</u>

ANNEX 1 - OBJECTIVES AND PARTNERS INVOLVED



ANNEX 2 – LIST OF ENTITIES INVOLVED

Entities	Structure	Component 1 Climate simulations	Component 2 Vulnerabilities and impact modelling	Component 3 Local knowledge and transmission methods	Component 4 Climate portal and Adaptation strategies	Component 5 Cross-cutting – Coordination and communication	Location of structures
IRD	UMR ENTROPIE	X	X		X	X	Noumea, New Caledonia
	UMR ESPACE-DEV		X	X	X	X	Noumea, New Caledonia
	Communication and Information Sharing Direction				X	X	Marseille, France / Noumea, New Caledonia
	International and European Relations Department					X	Marseille, France
Météo-France	Interregional Direction for New Caledonia and Wallis and Futuna	X			X	X	Noumea, New Caledonia
	Interregional Direction for French Polynesia	X			X	X	Faa'a, French Polynesia
	Climatology and Climate Services Direction	X			X	X	Toulouse, France
	Service de la Formation Permanente	X			X		Toulouse, France
	Centre National de Recherches Météorologiques - Modélisation du Système Climatique régional (CNRM)	X				X	Toulouse, France
AFD	Innovation, Research and Knowledge Division				X	X	Paris, France
	Pacific Regional Direction				X	X	Noumea, New Caledonia

ANNEX 3 – INVENTORY

TERRITORIES	PUBLIC POLICY DOCUMENTS	SOURCES	YEAR(S) OF IMPLEMENTATION IN ONGOING (GREEN) COMPLETED (RED)
New-Caledonia	Impacts du CC en zones littorales marines intertropicales	UNC/BC-Consult/IFRECOR/Ministère de l'Ecologie	2015
	Impacts du CC sur le site pilote du Grand-Sud, Province Sud, NC	Consortium BE (RESCCUE)/Province Sud/AFD-FFEM	Project 2015-2018
	Impacts du CC sur le site pilote de la Zone côtière Nord Est, Province Nord, NC	Consortium BE (RESCCUE)/Province Sud/AFD-FFEM	Project 2015-2018
	Rapport sur les enjeux d'une politique "climat" pour la Nouvelle-Calédonie	IRD-GNC-UNC-CEN-ADEME (INTEGRE)	2015
	Schéma pour la Transition Energétique de la Nouvelle-Calédonie (STENC)	Government	2016 à 2025
	Schéma pour la Transition Energétique de la Province Sud	Province Sud/Government	2017 à 2025
	Rapport cadre méthodologique d'élaboration feuille de route adaptation	BioeKo Consultant/Government /EU	2017
	Schéma de développement agricole provincial à l'horizon 2025	Province Sud/Government	2016-2025
	Schéma d'orientation pour une politique de l'eau partagée en NC	Government	2019-2030
	Plan Climat Energie Province Nord (PCEPN)	Province Nord/Government	2019 - 2024
Wallis and Futuna	Plan d'action Wallis et Futuna	INTEGRE/SPC/EU	2014-2018
	Stratégie d'adaptation au changement climatique	INTEGRE/SPC/EU	2017-2030
	Stratégie de développement durable	N/A	2017-2030
	Plan pluriannuel de développement du secteur primaire (PPDDSP)	N/A	2018-2030
	Programmation pluriannuelle de l'énergie WF	N/A	2019-2023
	Stratégie de convergence	Assemblée Territoriale/Government	2019-2030
French Polynesia	Plan Climat Stratégique	ADEME/AFD	2012
	Plan d'action PF	INTEGRE/SPC/EU	2014-2018
	Plan Climat-Energie	Government	2015-2025
	Plan de transition énergétique	Government	2015-2030
	Plan de relance CAP 2025	Government	2020-2025

	Schéma Directeur "Agriculture"	Ministère de l'Agriculture/AFD	2021-2030

TERRITORIES	PUBLIC POLICY DOCUMENTS	SOURCES	YEAR(S) OF IMPLEMENTATION IN ONGOING (GREEN) COMPLETED (RED)
Vanuatu	National Adaptation Programme of Action (NAPA)	NACC/GEF-UNDP/UNFCCC	2007
	National Water Strategy	Department of Geology, Mines & Water Resources/NZAID	2008-2018
	Vanuatu National Energy Roadmap	Government	2013 - 2030
	Vanuatu Strategic Tourism Action Plan	Ministry of Tourism, industry, commerce & Ni-Vanuatu Business	2014-2018
	Vanuatu Framework for Climate Services	Department of Meteorology and Geo-hazard/RTSM-SPREP/ADB	2016
	National Ocean Policy	National Committee for Maritime Boundary Delimitation & Ministry of Tourism/MACBIO project (GIZ/IUCN/SPREP/BMUB)	2016
	Vanuatu National Biodiversity Strategy and Action Plan (NBSAP)	Department of Environmental Protection and Conservation (DEPC)	2018 - 2030
	Vanuatu's First Nationally Determined Contribution (NDC)	Ministry of CC/UNFCCC	2020
	National Adaptation Plan (NAP)	Ministry of CC/GCF	2020
	Vanuatu Third National Communication Report	Ministry of CC/GEF-UNDP	2020
	National Sustainable Development (NSDP) Plan 'Vanuatu 2030 The people's plan'	Government	2016 – 2030
	Vanuatu Climate Change and Disaster Risk Reduction Policy	Government-NAB CC/Australian aid-UNDP-SPC-GIZ-VCAN-VANGO	2016 - 2030
	Vanuatu Forest Policy	Department of Forests/SPC-GIZ	2013-2023
	Vanuatu National Fisheries Sector Policy	MALFFB/VCAP/GEF-UNDP	2016-2031
	Agriculture Sector Policy	MALFFB/LAEFSTOK/SPC-GIZ/PAPP	2015-2030
	National Livestock Policy	MALFFB/LAEFSTOK/SPC-GIZ/PAPP	2015-2030
	Gudfala Kakae Policy	MALFFB/LAEFSTOK/SPC-GIZ/PAPP	2017-2030
	National Environment Policy and Implementation Plan (NEPIP) 2016–2030	Government/SPREP/UNEP/SPC-GIZ/FAO-UN	2016–2030
	National Waste Management and Pollution Control Strategy and Implementation Plan	DEPC/JICA/SPREP	2016-2020