

APPLYING INFORMATION FOR CLIMATE CHANGE ADAPTATION PLANNING & DECISION MAKING IN THE PACIFIC:

Situation analysis

PACIFIC ICLIM PROJECT



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Authors

Kate Morioka (lead), Madeleine McGann, Sam Mackay and Brendan Mackey

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Contact Information

Pacific iCLIM Project
Griffith University Climate Change Response Program
Brisbane QLD 4111, Australia
Telephone: +61 7 3735 7599
Email: m.mcgann@griffith.edu.au

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EXECUTIVE SUMMARY

Supporting the Pacific to improve climate change information management is a critical component of the Australian Government's investment in building resilience and improving climate adaptation in the Pacific. As part of that portfolio, the Australian Department of Foreign Affairs and Trade (DFAT) has funded Griffith University to work in partnership with the Secretariat of the Pacific Regional Environment Programme (SPREP) through the project *Supporting the Regional Management of Climate Change Information in the Pacific* (the Pacific iCLIM Project).

Over the course of the Pacific iCLIM Project, strong partnerships with SPREP and participating countries have been established, leading to co-design of fit-for-purpose information and knowledge management (IKM) solutions and processes. Accordingly, it was considered appropriate to engage with project partners to conduct an appreciative inquiry to better understand how climate change information informs climate change adaptation planning and decision making in the Pacific. A situation analysis was subsequently carried out to:

1. Develop an understanding of how climate change information was being used for adaptation planning and decision making by technical officers and decision makers within Pacific national governments and regional organisations.
2. Document good practice and experiences of how information can support adaptation planning and decision making.

The **method** for the situation analysis involved a series of comprehensive interviews and self-administered questionnaires with technical officers and decision makers from three Pacific governments involved in the Pacific iCLIM Project, Papua New Guinea, Tonga and Tuvalu. To provide a regional lens, the situation analysis also focussed on SPREP as a regional organisation. As a first step to provide contextual understanding, a policy analysis of climate adaptation planning frameworks was conducted to provide an analytical foundation for assessing information collected via informants. Comprehensive semi-structured interviews were conducted with 22 informants, bolstered by 13 self-administered questionnaires. The information collected was synthesised into case studies identifying how climate change information supports broad processes of: (i) national adaptation planning; (ii) gender and social inclusion; and (iii) specific sectors, including road infrastructure in Papua New Guinea and coastal management in Tuvalu. Interview transcripts and case studies were verified by all informants.

Broadly, the **findings** of the situation analysis were:

- The tendency towards deliberative governance and collective decision making in the Pacific lends itself to a values-driven and vulnerability-centred adaptation decision analysis, using a combination of climate and non-climate information, including socio-economic data and qualitative data from consultations.
- Innovative and unique techniques of IKM are employed in the Pacific region which indicate good practice based on collaborative methods and localised solutions that are actively improving decision making processes.
- There is a diverse application of data and information for adaptation planning. Climate and non-climate information is widely applied by national government agencies in policy formulation, project planning, resilience planning, climate action, and communication and reporting.
- There is recognition of the emerging role of national climate change agencies in capturing and generating localised knowledge and brokering information with stakeholders, both domestically and regionally.
- National climate change governance bodies enable collaboration and information sharing between diverse stakeholders and provide an effective platform for mainstreaming climate change and gender considerations into national adaptation and sectoral planning.
- Challenges relating to information management and systems remain as significant barriers to well-informed and versatile decision making on adaptation. These need to be properly addressed by countries and SPREP to ensure the national adaptation planning processes are strongly supported by institutional policies, procedures, leadership, technology, resourcing and expertise.

Based on these findings, **key considerations** for strengthening the application of information for adaptation planning and decision making in the Pacific were identified, including:

- **Continued improvement of information management systems:** The complexity of climate change information and technological advancements necessitates ongoing investment and improvements in national and regional systems to increase accessibility, discoverability, use, reuse and dissemination of climate change information.
- **Regional knowledge brokering capacity:** The information needs of countries to effectively plan for and implement sustainable adaptation actions requires dedicated resourcing of regional bodies (like SPREP) to fulfil their knowledge brokerage role and to deliver timely and credible information services to member countries and territories.
- **Support to national agencies:** Development assistance and technical support should target improving information and knowledge management skills and capacity within government institutions, with a wider contextual focus on how information and knowledge is created, used and shared in each country.
- **Community of practice:** There is an opportunity for peer-to-peer learning to share IKM lessons and approaches through regional governance arrangements, including the Pacific Resilience Partnership.
- **Partnerships on applied research:** Countries need support in balancing rigour and applicability of scientific and non-scientific information, and in managing knowledge development processes. Applied research is needed to assist countries assess climate risks and identify robust adaptation actions using the best available data and information.
- **Investment in capacity of meteorological services to communicate scientific data and information on climate-related conditions and hazards:** Investment should continue to increase the expertise and capacity of national meteorological services to generate country-specific climate projections and undertake forecasting and modelling to meet the needs of different users.
- **Further investment in non-climatic data and information:** Greater investment is needed to ensure the additional non-climatic data and information required for adaptation planning and decision making is available, including a systematic process for gathering, measuring, applying and disseminating gender and social information.

This report concludes by presenting a proposed IKM 'workflow guideline' to support the preparation of National Adaptation Plans (NAP) and other adaptation planning processes. This workflow guideline aims to provide a practical tool for countries and regional organisations in the Pacific to better assess their information requirements and knowledge outputs for adaptation planning and decision analysis.

ACRONYMS & ABBREVIATIONS

ADB	Asian Development Bank
BRCC	Building Resilience to Climate Change Project (Papua New Guinea)
CCDA	Climate Change and Development Authority (Papua New Guinea)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
COP	Conference of Parties
COSPPac	Climate and Oceans Support Program in the Pacific (Australian Government)
CREWS	Climate Risk and Early Warning Systems (World Meteorological Organisation)
CROP	Council of Regional Organisations in the Pacific
CSO	Civil Society Organisation
DCA	Department of Community Affairs (Tuvalu)
DCCD	Department of Climate Change and Disaster (Tuvalu)
DCDR	Department of Community Development and Religion (Papua New Guinea)
DFAT	Australian Department of Foreign Affairs and Trade
DPM	Department of Personnel Management (Papua New Guinea)
DSP	Development Strategic Plan 2010-2030 (Papua New Guinea)
ENSO	El Niño-Southern Oscillation
FRDP	Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management 2017-2030
GAD	Gender Affairs Department (Tuvalu)
GCF	Green Climate Fund
GEF	Global Environment Facility
GESI	Gender Equity and Social Inclusion
IISD	International Institute of Sustainable Development
IKM	Information Knowledge Management
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
JNAP	Joint National Action Plan on Climate Change and Disaster Risk Management (Tonga)
LDC	Least Developed Countries
MEIDECC	Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (Tonga)
MIA	Ministry of Internal Affairs (Tonga)
MRV	Measurement, Reporting and Verification
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contributions



NIWA	National Institute for Water and Atmospheric Research (New Zealand)
NWS	National Weather Service (Papua New Guinea)
ODW	Office of the Development of Women (Papua New Guinea)
PCCC	Pacific Climate Change Centre
PCCP	Pacific Climate Change Portal
PMU	Project Management Unit
PWD	Public Works Department (Tuvalu)
SIDS	Small Island Developing States
SPC	Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TCAP	Tuvalu Coastal Adaptation Project
TIVA	Tuvalu Integrated Vulnerability Assessment
TWG	Technical Working Group
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USP	University of the South Pacific

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1. INTRODUCTION

This report presents the findings of a situation analysis of information for climate change adaptation planning and decision making in the Pacific carried out by the Griffith University Climate Change Response Program (GCCRP). This analysis was conducted under the Australian Government Department of Foreign Affairs and Trade (DFAT) funded project *Supporting the Regional Management of Climate Change Information in the Pacific* (Pacific iCLIM Project).

1.1 PACIFIC ICLIM PROJECT

The Pacific iCLIM Project aims to enable better climate change resilience and adaptation planning in the Pacific region by improving the discoverability, storage, access and utilisation of climate change data and information. The six year project (2014-2019) is being implemented by the GCCRP in collaboration with the Secretariat of the Pacific Regional Environment Programme (SPREP). Over this time, a strong partnership has been established between Griffith University, SPREP and participating countries, which has resulted in co-learning of ideas and practices on Information Knowledge Management (IKM) as well as co-design of climate change portals and decision support tools.

Phase 1 of the Pacific iCLIM Project identified considerable barriers to information management in the Pacific, including barriers concerning policy, institutional, operational and human resources, and information and communication technology.¹

Phase 2 focuses on developing and deploying information and knowledge management (IKM) systems and strategies to strengthen the use and management of climate change data information and knowledge in the Pacific (see Box 1). This is being achieved through four key objectives:

1. Strengthening the existing regional IKM system by supporting increased participation.
2. Encouraging good IKM practice in the Pacific region by supporting the development of a regional guideline for climate change IKM actions.
3. Facilitating collaboration with development partners, Council of Regional Organisations in the Pacific (CROP) and national governments in order to improve national IKM practice.
4. Documenting how IKM can enhance adaptation planning and decision making in the Pacific.

Experiences and knowledge garnered from the Pacific iCLIM Project indicate that effective IKM practices can enable evidence-based policy and decision making, deliver organisational efficiencies, protect organisational interests, and create opportunities for innovation and growth.² The project has found that for IKM to be successful, it is critical to consider both demand and user needs for climate change IKM to ensure widespread ownership and participation in the IKM solutions that lead to greater adaptation and resilience outcomes.

¹ Mackay, S., Brown, R., Gonelevu, M., Pelesikoti, N., Kocovanua, T., Iaken, R., Iautu, F., Tuiafitu-Malolo, L., Fulivai, S., Lepa, M., and Mackey, B. (2019). Overcoming barriers to climate change information management in small island developing states: lessons from Pacific SIDS, *Climate Policy*, 19(1), 125-138. doi: 10.1080/14693062.2018.1455573

² Griffith University and SPREP. (2016). *Information and Knowledge Management for Climate Change (IKM4CC) Strategic Framework: Guidelines for the Pacific Region*. Brisbane: Griffith University.

Box 1. Pacific iCLIM Project Phases

In the first phase of the Pacific iCLIM project (iCLIM 1, 2014-2016), regional and national IKM systems were enhanced to underpin SPREP's Pacific Climate Change Portal (PCCP). This involved the development of national climate change data portals for Fiji, Tonga and Vanuatu, and the design and delivery of targeted IKM training, capacity building and awareness raising among national stakeholders.

In the current phase (iCLIM 2, 2017-2019), technical support for portal development and organisational IKM planning is being provided to four additional countries: the Federated States of Micronesia, Papua New Guinea, Samoa and Tuvalu. At the regional level, the project has designed and launched two decision support tools on the PCCP: the Adaptation Project Tool and the Climate Finance Navigator. These tools are being promoted through national training and regional climate change events by SPREP.

1.2 PURPOSE AND OBJECTIVES

The importance of data, information and knowledge in effective climate change adaptation and resilience planning is gradually being recognised in the Pacific region. In recent years, increased attention on the development of National Adaptation Plans³ (NAP) has contributed to a growing demand for the climate change related data, information and knowledge needed for understanding climate hazards, their impacts, the risks they bring to society and ecosystems, along with evaluation of adaptation options, establishing baseline conditions and undertaking monitoring and evaluation. At the same time, there is a plethora of adaptation projects in the region that utilise climate change related data, information and knowledge, and in turn generate lessons on effectiveness of adaptation interventions. Nevertheless, research literature that examine the effectiveness of adaptation actions in small island countries globally, and in the Pacific, is still generally scarce.⁴ There is limited documented evidence on how climate change related information is used to inform adaptation decision making, and little has been published examining the nexus between information and adaptation decisions in the Pacific.

The purpose of the situation analysis was to examine how climate change information was being used for adaptation planning and decision making in the Pacific. The analysis focused on three national governments already participating in the Pacific iCLIM Project (Papua New Guinea, Tonga and Tuvalu) and SPREP.

The objectives of the situation analysis were to:

1. Develop an understanding of how climate change information was being used for adaptation planning and decision making by technical officers and decision makers within Pacific national governments and regional organisations.
2. Document good practice and experiences of how information can support adaptation planning and decision making.

1.3 USES OF THIS REPORT

The findings of this report are intended to inform strategic planning by Pacific island countries, regional agencies and development partners by:

- providing a strategic basis for future investments in the Pacific, particularly in the areas of knowledge exchange and brokering, information services and decision support systems for climate change adaptation and mitigation; and

³ For details on NAPs, refer to Section 3.1

⁴ Klock, C., and Nunn, P.D. (2019). Adaptation to Climate Change in Small Island Developing States: A Systematic Literature Review of Academic Research. *Journal of Environment & Development*, 28(2), 196-218.

- summarising current practices of using information within regional and national institutions, and outlining potential improvements to more effectively apply, manage and share climate change information.

The report findings provide guidance to SPREP to formulate the future strategic role of the new Pacific Climate Change Centre (PCCC) to meet the climate change information needs of member countries and territories in the Pacific region. The report is also intended to assist Pacific governments to determine information requirements for the formulation and implementation of their NAPs and other adaptation planning processes. The experiences, gaps and challenges identified in the case studies can be used to develop and review government policies and procedures on IKM, and to improve the way information is collected, stored, analysed, applied and disseminated to facilitate better climate change adaptation planning and decision making practices.

1.4 REPORT STRUCTURE

This report is structured into five sections:

- Section 1 outlines the purpose and objectives of the situation analysis.
- Section 2 summarises the approach and methodology.
- Section 3 provides a framework analysis of adaptation decision making approaches and an overview of the current status of NAP formulation in the Pacific.
- Section 4 details the synthesised analysis of the case studies developed from interviews and surveys undertaken with informants, and presents key findings and good practice.
- Section 5 concludes with a set of key considerations for new and renewed investments in IKM. A visual IKM workflow guideline is also presented to assist countries and organisations in the Pacific assess information requirements and manage knowledge for adaptation planning and decision making.

1.5 TERMINOLOGY

For the purpose of this report, the term 'information and knowledge management' (IKM) is used to denote the process of organising and handling the collection of data, information and knowledge necessary for adaptation planning and decision making. The terms data, information and knowledge are used discretely in their normal meaning.

2. METHODOLOGY

This section of the report describes the approach and method used for the situation analysis, and the rationale for the selection of case studies.

2.1 APPROACH AND SCOPE

Based on the existing partnerships and the knowledge derived from the delivery of Pacific iCLIM Project activities, there was an opportunity to engage with partners to conduct an appreciative inquiry on the use of information for adaptation planning and decision making generally, and in selected sectors (refer to Table 1).

Appreciative inquiry is a method of action research that attempts to bring about developmental change in organisations and systems through collection of best experiences, rather than critique existing theory and practice.⁵ Subsequently, this leads to the creation of new theories and ideas which can be applied to enhance good practice. The appreciative inquiry approach complements the Project's ongoing engagement with partner organisations in advancing their IKM practice.

The governments of Papua New Guinea, Tonga and Tuvalu were selected for the situation analysis. The differences in culture, government institutions, population, geography and economy of the three countries contributed to the comparative diversity of case studies.

The situation analysis also examined SPREP as a regional organisation given its role in implementing the Pacific iCLIM Project with Griffith University, and its ongoing mandate and leadership on IKM for climate change and the environment. Initially, the focus of the enquiry was SPREP's Climate Resilience Programme however this expanded more broadly to SPREP as an organisation to reflect the inter-departmental responsibilities for climate change adaptation planning and gender and social inclusion.

Table 1. Situation Analysis: Areas/Sectors

Focus Area/Sector	Papua New Guinea	Tonga	Tuvalu	SPREP
National adaptation planning	✓	✓	✓	✓
Gender and social inclusion	✓	✓	✓	✓
Road Infrastructure	✓			
Coastal management			✓	

Gender and social inclusion, as a cross-cutting consideration, was explored for all three national governments and SPREP. Specifically, the analysis considered how age and gender specific demographic and socio-economic data and information is being used by national climate change and gender affairs agencies, and SPREP to inform planning and decision making on climate change adaptation.

For the additional sector analysis, coastal management and roads infrastructure were selected based on the climate adaptation priorities of the respective countries. In Tuvalu, coastal management is at the centre of the Tuvalu Coastal Adaptation Project (TCAP), a seven year US\$36 million project funded by the Green Climate Fund (2017-2023). In Papua New Guinea, the land transport infrastructure sector was chosen as one of the main investment areas for international and Australian aid.

⁵ Bushe, G.R. (2001). Five theories of change embedded in appreciative inquiry. In Cooperrider, D. (eds), *Appreciative Inquiry: An Emerging Direction for Organization Development*, (pp.117–127). Champaign, IL: Stripes; Cooperrider, D.L., and Srivastva, S. (1987). Appreciative inquiry in organizational life. In Pasmore, W. and Woodman, R. (eds), *Research In Organization Change and Development*, (pp.129-169). Greenwich, CT: AI Press.

2.2 METHOD

The method used for the situation analysis involved an iterative process of framework analysis, comprehensive interviews, a self-administered online questionnaire and case study analysis (refer to Figure 1).



Figure 1. Situation analysis methodology

An initial framework analysis was conducted to develop a conceptual understanding of global and regional climate change adaptation decision making frameworks. Framework analysis is a qualitative method used for applied policy research to describe and interpret existing setting, and to identify new theories and actions. The initial analysis drew on experiences and knowledge gained from the Pacific iCLIM Project, including existing issues and barriers associated with IKM. Formal and grey literature on adaptation planning and decision making was also reviewed. The analysis resulted in the formulation of interview and survey questions, and the development of an analytical framework against which the findings of the interviews and surveys were assessed to contextualise adaptation planning and decision making practices in the Pacific.⁶

Between April and July 2019, 22 people were interviewed and 13 responses were received for the online self-administered survey. Initially, informants were identified through Pacific iCLIM Project focal points in each country, these being the Climate Change Development Authority (CCDA) in Papua New Guinea, the Department of Climate Change (DCC) in Tonga, and the Department of Climate Change and Disaster (DCCD) in Tuvalu. The focal points assisted to identify other relevant departments to be interviewed. The interviews were conducted primarily in person, and some via telephone. The list of participating organisations is provided in Annex 1 and the list of interview and survey questions is provided in Annex 2. All informants were supplied with a written record of the interview for verification.

The comprehensive results of the interviews and questionnaires were synthesised into thematic case studies. Draft case studies were shared with key informants for validation in July 2019. The study results were analysed to refine the preliminary framework analysis. This aided in understanding the relationship between information, knowledge and decision making. The findings were interpreted using schematic diagrams and tables to comprehend current thinking and practice, and to identify opportunities to enhance the application of information for adaptation planning and decision making in the Pacific region.

2.3 ETHICS CLEARANCE

Full ethical clearance was received for the situation analysis from Griffith University's Human Research Ethics Committee on 16 April 2019 under the following title and reference number: "Situation Analysis: How IKM is currently used in the Pacific to support effective adaptation planning and decision making" (GU Ref No: 2019/319). The research was conducted in accordance with the *Australian National Statement of Ethical Conduct in Research Involving Humans* (2007).

⁶ Srivastava, A., and Thomson, S.B. (2009). Framework Analysis: A Qualitative Methodology for Applied Policy Research. *JOAAG*, 4(2).

3. FRAMEWORK ANALYSIS: ADAPTATION PLANNING AND DECISION MAKING

This section provides a framework analysis to contextualise current thinking on IKM for adaptation planning and decision making based on findings from existing literature and learnings from the Pacific iCLIM Project. The section includes a background on NAPs as a key policy driver for current adaptation planning efforts in the Pacific, followed by an overview of the current status of NAP formulation in the Pacific. The trajectory of adaptation decision making approaches and frameworks, and their implication on information requirements is also considered.

3.1 NATIONAL ADAPTATION PLANS

The NAP process has received increased attention among Pacific countries following the endorsement of the Paris Agreement at the twenty-first Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. The Paris Agreement emphasises the need for enhancing adaptation support to countries that are most vulnerable to the effects of climate change, including Least Developed Countries (LDCs) and Small Island Developing States (SIDS).⁷

Established as part of the Cancun Adaptation Framework at the sixteenth Conference of Parties to the UNFCCC in 2010, the NAP provides a means for LDCs and interested developing countries to identify and address their medium- and long-term adaptation needs.⁸ The agreed objectives of the NAP process are⁹:

- a) to reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience; and
- b) to facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

National adaptation planning is a continuous and iterative process, with NAP implementation grounded in nationally identified priorities and harmonised with national sustainable development objectives, policies and plans.¹⁰ The NAP process is characterised by ‘non-prescriptive, country-driven, gender-sensitive, participatory and transparent’ approaches that consider vulnerable groups, communities and ecosystems, and are based on and directed by best available science, and where appropriate, traditional and indigenous knowledge, and local knowledge systems.¹¹

The Adaptation Committee was established under the Cancun Adaptation Framework to promote enhanced and coordinated adaptation actions among Parties. The delivery of technical guidance and support, and sharing of information, knowledge and good practice are facilitated through the Adaptation Committee.¹² For LDCs, the mandate of the LDC Expert Group was extended to cover technical guidance and advice on the NAP process.¹³ The technical guidelines for the development of NAPs issued by the LDC Expert Group identifies four key elements and corresponding steps of the NAP process, as shown in Table 2. As the NAP guidelines are not intended to be prescriptive, countries have the flexibility to select steps that are appropriate for their situation and implement them in any order according to their needs.

⁷ Paris Agreement, Article 7

⁸ Decision 5/CP.17

⁹ Decision 5/CP.17, paragraph 1

¹⁰ Decision 5/CP.17, paragraph 2

¹¹ Decision 5/CP.17, paragraph 3

¹² Decision 1/CP.16

¹³ Decision 6/CP.16

Table 2. NAP elements and corresponding steps

Element	Steps
A. Lay the groundwork and address gaps	<ol style="list-style-type: none"> 1. Initiating and launching the NAP process 2. Stocktaking: identifying available information on climate change impacts, vulnerability and adaptation and assessing gaps and needs of the enabling environment for the NAP process 3. Addressing capacity gaps and weaknesses in undertaking the NAP process 4. Comprehensively and iteratively assessing development needs and climate vulnerabilities
B. Preparatory elements	<ol style="list-style-type: none"> 1. Analysing current climate and future climate change scenarios 2. Assessing climate vulnerabilities and identifying adaptation options at the sector, subnational, national and other appropriate levels 3. Reviewing and appraising adaptation options 4. Compiling and communicating national adaptation plans 5. Integrating climate change adaptation into national and subnational development and sectoral planning
C. Implementation strategies	<ol style="list-style-type: none"> 1. Prioritizing climate change adaptation in national planning 2. Developing a (long-term) national adaptation implementation strategy 3. Enhancing capacity for planning and implementation of adaptation 4. Promoting coordination and synergy at the regional level and with other multilateral environmental agreements
D. Reporting, monitoring and review	<ol style="list-style-type: none"> 1. Monitoring the NAP process 2. Reviewing the NAP process to assess progress, effectiveness and gaps 3. Iteratively updating the national adaptation plans 4. Outreach on the NAP process and reporting on progress and effectiveness

Source: Least Developed Countries Expert Group, 2012

The 2015 Paris Agreement accentuated the NAP process by requiring all Parties, as appropriate, to communicate adaptation priorities, and engage in adaptation planning and implementation of adaptation actions.¹⁴ The Paris Agreement recognises adaptation as a challenge at local, subnational, national, regional and international levels, and called on greater international cooperation and support on adaptation, specifically for countries most vulnerable to the effects of climate change.

In response to the request made by the COP, the newly established Green Climate Fund (GCF) agreed to provide financial support for NAP formulation through its Readiness and Preparatory Support Programme, with each country eligible to apply for up to US\$3 million towards the development of NAPs and other adaptation planning.¹⁵ The GCF guidance on the preparation of NAP proposal emulates the underlying objectives and approaches of NAPs by placing an emphasis on country ownership, gender sensitivity and social inclusion.

3.2 STATUS OF NATIONAL ADAPTATION PLANS IN THE PACIFIC

The NAP journey for Pacific island countries has been slow, but the momentum garnered via the Paris Agreement has contributed to the growing importance of NAPs as a vehicle for adaptation and resilience planning, and for mobilising international assistance on national, subnational and sectoral adaptation initiatives.

Most countries in the region are in the initial phases of laying the groundwork and preparing for the NAP process. Through various regional programmes and national projects, many have completed vulnerability assessments at the national level and for selected subregions and sectors. Similarly, many countries are working towards

¹⁴ Paris Agreement, Article 7

¹⁵ GCF Board decision B.13/09

integrating climate change adaptation into national and subnational development and sectoral planning, with some countries doing so more effectively than others (refer to country case studies in the Appendix). Some countries are further advanced in the NAP process, including Tonga, which uses its Joint National Adaptation Plan on Climate Change and Disaster Risk Management (JNAP) (now in Phase 2) as a basis for medium and long-term adaptation planning, and for integrating adaptation into national development planning (see the case study on national adaptation planning in Tonga).

Although a handful of Pacific countries are currently engaged in the initial stages of NAP formulation, none have secured funding from the GCF Readiness and Preparatory Support Programme (as at 31 July 2019). Realising that countries need technical assistance with preparing their NAP proposals, SPREP, as an accredited entity to the GCF, has recently increased its support to member countries (see case study on SPREP's support to national adaptation planning). Accordingly, Tuvalu is expected to submit its NAP proposal to the GCF later this year, as is Papua New Guinea, via support from a co-led United Nations Development Programme (UNDP) and United Nations Environment initiative.¹⁶

Some Pacific countries have tapped into the NAP Global Network to carry out vulnerability assessments for the development of NAPs. The NAP Global Network is a platform designed to facilitate peer exchange and learning, technical assistance and bilateral support for decision makers and practitioners involved in the NAP process.¹⁷ The Network is managed by the International Institute for Sustainable Development (IISD) and funded by the governments of Canada, Germany and the United States. To date, the NAP Global Network has supported Fiji, Kiribati, Solomon Islands and Tuvalu in carrying out integrated vulnerability assessments using a human security and livelihoods approach, and with a focus on different societal groups (discussed further in the Tuvalu case study).

At the regional level, the *Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management 2017-2030* (FRDP) complements and supports the NAP process by underscoring the importance of national, subnational and sectoral resilience planning. Endorsed by Pacific Island Forum Leaders in September 2016, the FRDP is a regional policy document that provides an integrated and all-stakeholder approach for addressing climate change and disaster risks. One of the three strategic goals of the FRDP focuses on adaptation in order to achieve risk reduction and to strengthen resilient development in the region. Voluntary actions covering adaptation include the development of NAPs, along with capacity building, collaboration and partnership, information and knowledge management and resilience planning of policies, programmes, strategies and financing at all levels (FRDP, Goal 1). The FRDP, combined with the formation of Pacific Resilience Partnership (PRP), has increased the demand for climate change data sharing, information exchange, knowledge transfer and collective learning in the Pacific region.¹⁸

3.3 APPROACHES TO ADAPTATION DECISION MAKING

To understand how climate and non-climate information is used in the NAP process, and more broadly for adaptation decision making, it is useful to briefly examine methodological frameworks guiding climate change adaptation decision making and their information requirements. Over the past two decades, several frameworks have been developed to assist countries plan for and decide on their adaptation pathways. Some examples include the United Kingdom Climate Impacts Programme's climate risk decision framework¹⁹, the Intergovernmental Panel on Climate Change's (IPCC) 'seven-step approach'²⁰ and the UNDP Adaptation Policy

¹⁶ UNDP is also an accredited entity to the GCF

¹⁷ More information on the NAP Global Network is available from its website: <http://napglobalnetwork.org/activities/>

¹⁸ Pacific Resilience Meeting Outcome Statement. Available at: <https://www.spc.int/updates/news/2019/05/pacific-resilience-meeting-outcomes-statement>

¹⁹ Willows, R. I. and Connell, R. K. (2003). *Climate Adaptation: Risk, Uncertainty and Decision-Making. UKCIP Technical Report*. Oxford: UK Climate Impacts Programme.

²⁰ Carter, T.R., Parry, M.L., Nishioka, S., Harasawa, H., Christ, R., Epstein, P., Jodha, N.S., Stakhiv, E. and Scheraga, J. (1996). *Technical guidelines for assessing climate change impacts and adaptations. Climate Change 1995 - Impacts, Adaptations*

Framework²¹. The following section reviews the development of adaptation planning from the early stages focussed on impact and vulnerability, with an emphasis on scientific climate-related data, to the more recent emphasis on integrated risk assessment, systems thinking, and assimilation of a wide range of types and sources of data, information and knowledge.

These frameworks are accompanied by methods and tools (i.e. cost-benefit, multi-criteria, vulnerability analysis) designed for specific users and sectors, and applicable to policy, project and programme-related decisions. The general steps for decision making outlined in these frameworks are synthesised and depicted in Figure 2.

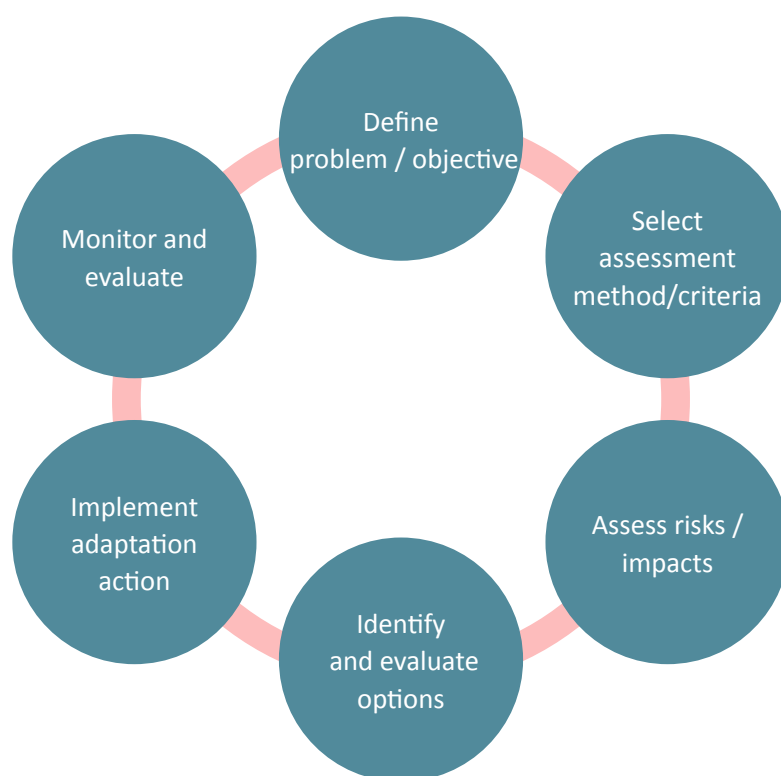


Figure 2. Adaptation decision making frameworks: key steps

These frameworks are decision-oriented with a strong focus on risk assessment, and feature three common elements that require the application of climate information: (i) initial risk screening; (ii) detailed risk analysis; and (iii) assessing risk management options.²² According to Lu (2012), each element demands different types and levels of scientific climate-related data and information, and assessment methods and tools as shown in Table 3.

and Mitigation of Climate Change: Scientific-Technical Analyses. Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change.

²¹ United Nations Development Programme. (2005). *Adaptation Policy Frameworks for Climate Change: Developing Strategies, Policies and Measures*. Cambridge University Press.

²² Lu, X. (n.d.). *National Communications Support Programme Applying Climate Information for Adaptation*. United Nations Development Programme, United Nations Environment Programme and Global Environment Facility.

Table 3. Adaptation decision elements, information requirements and associated tools

Decision element	Decision objective	Level of information required	Type of climate information required	Associated methods and tools
Initial risk screening	Determine the sensitivity of a function and service of a system or activity to current and future climate trends	Low-Medium	<ul style="list-style-type: none"> Observed historical data on climate and extreme events (30-50 years) Trend in projections of future climate 	<ul style="list-style-type: none"> Sensitivity analysis Preliminary vulnerability assessment
Detailed risk analysis	Determine and assess significance of risks on a system or activity	Medium-High	<ul style="list-style-type: none"> Observed historical data on climate and extreme events Climate change projections at different spatial and temporal scales 	<ul style="list-style-type: none"> Trend analysis to determine critical threshold Risk assessment
Assessing risk management options	Assess feasibility and efficiency of adaptation options	Low, Medium, High	<ul style="list-style-type: none"> Climate change projections at different spatial and temporal scales 	<ul style="list-style-type: none"> Scenario analysis Feasibility analysis Cost benefit analysis Policy analysis

Source: adapted from Lu (2011)

The type and sources of scientific climate-related data and information warranted for each element include²³:

- **Initial risk screening** requires a moderate level of climate science to determine the sensitivity of a function and service of a system or activity to current and future climate trends. This normally involves sensitivity analysis and preliminary vulnerability assessment. Broad understanding of the future climate is also required to ascertain if current observations in climate variables are likely to continue. Observed data on climate variables typically include temperature, precipitation and extreme events which are largely available through national meteorological services or international institutions. Future changes to climate variables are derived through climate scenarios generated from Global Climate Model simulations, of which outputs are available from the IPCC.
- **Detailed analysis** follows initial screening of risks, to further determine and assess the significance of the risks on a system or activity, by examining the exposure and the vulnerability of a system or activity to climate hazards. In this stage, critical thresholds are identified to provide a coping range for a system or activity as well as their state of vulnerability to climate change impacts. This stage requires detailed climate observations and climate scenarios for different spatial and time scales to understand how the impacts of hazards may change in the future. Detailed data is not always available from national government sources and may need to be specifically generated or acquired. The climate variables to be used for the detailed risk assessment depends on the system or activity being considered. For example, designing coastal protection measures will entail detailed analysis of sea level, wave action, wind and cyclonic activity as climate variables to determine the potential impact of coastal flooding and storm surge. For water resources, water availability and supply will be assessed using temperature, rainfall and evaporation as climate variables.
- **Assessing risk management options** requires low to high level of climate information depending on the type of adaptation intervention and the planning horizon (e.g. 10, 20, 50 year) considered to evaluate the efficiency of adaptation options. It is usually achieved through conducting scenario analysis in concurrence with other economic and policy assessments (e.g. feasibility, cost-benefit and policy analyses) to identify suitable adaptation measures in the context of future climate conditions. Similar to detailed analysis, scientific climate-related information required for this stage will need to be specifically sourced or generated using relevant technical methods and techniques.

²³ Lu, n.d.

The commonality between elements is the requirement for climate modelling and projections, which lend itself to a science-centred risk-based approach to adaptation planning.²⁴ In this approach, decision making processes are focused on the outputs of scenario modelling, that is, potential impacts associated with current and future climate. Conventional risk-based approaches however, are constrained by spatial (e.g. country, region, island) and temporal (e.g. annual, seasonal, daily) dynamics of projecting future climate change and its impacts, emissions pathways influenced by socio-economic and technological trends, climate model assumptions and presence of multiple risk factors.²⁵

Current adaptation planning approaches have developed from a vulnerability-based approach to being reframed into a risk perspective. Climate risk is defined as a function of the impacts on a human or natural system from a climate-related hazard, given its exposure and vulnerability.²⁶ Risk assessment provides an avenue for scientific data and information to be translated into policy making.²⁷ Transforming science into useful and usable product to support decision making is the premise of climate services.²⁸ The role of risk science in dealing with complex global problems like climate change, therefore, is progressively being refined as new risks emerge and are added to the dynamic and multi-faceted mix of risks, including those concerning possible consequences of impacts, societal values and priorities, and scientific uncertainties.²⁹ This complex interplay poses legitimate challenges for decision making, including how risks (particularly unforeseen risks) can be managed and uncertainties reduced, and if such interventions actually leads to more effective adaptation decisions.³⁰

3.4 REFINED APPROACHES TO ADAPTATION DECISION MAKING

Whilst earlier adaptation decision making frameworks had a strong emphasis on climate observations and scenario modelling as a starting point for adaptation planning, contemporary literature and practices have contributed to the emergence of more complex and sophisticated methods that focus on interactions between socio-economic and spatial dynamics of risks, and values-centred stakeholder deliberations.³¹ It is now widely recognised that the components of risk (hazard, exposure and vulnerability) are non-static and continuously changing across temporal and spatial scales, thus requiring a regionalised or localised conceptualisation and understanding of risks.³² The contemporary methods entail qualitative and quantitative assessments of social and economic determinants of vulnerability and adaptive capacity³³ in combination with climate projections and scenario modelling.

In the case of the Pacific region, the International Union for Conservation of Nature's (IUCN) research on adaptation planning in the Pacific islands in 2012 found qualitative community-based vulnerability assessments served as the starting point for the development of national disaster risk management plans, National Adaptation Programmes of Action (NAPA), initial national communication reports to the UNFCCC and other

²⁴ Lal, P.N. (2012). *Climate Change Adaptation in the Pacific: Making Informed Choices*. Canberra: Commonwealth of Australia.

²⁵ Adger, W. N., Brown, I., & Surminski, S. (2018). Advances in risk assessment for climate change adaptation policy. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 376(2121), 20180106. <https://doi.org/10.1098/rsta.2018.0106>; Lu, n.d.

²⁶ Jurgilevich, A., Räsänen, A., Groundstroem, F., and Juhola, S. (2017). A systematic review of dynamics in climate risk and vulnerability assessments. *Environmental Research Letters*, 12(1). <https://doi.org/10.1088/1748-9326/aa5508>; Connelly, A., Carter, J., Handley, J., and Hincks, S. (2018). Enhancing the practical utility of risk assessments in climate change adaptation. *Sustainability (Switzerland)*, 10(5), 1–12. <https://doi.org/10.3390/su10051399>

²⁷ Connelly et al, 2018

²⁸ Christel, I., Hemment, D., Bojovic, D., Cucchiatti, F., Calvo, L., Stefaner, M. and Buontempo, C. (2018). Introducing design in the development of effective climate services. *Climate Services*, 9, 111-121. <https://doi.org/10.1016/j.cliser.2017.06.002>

²⁹ Adger et al, 2018

³⁰ Adger et al, 2018

³¹ Jurgilevich et al, 2017

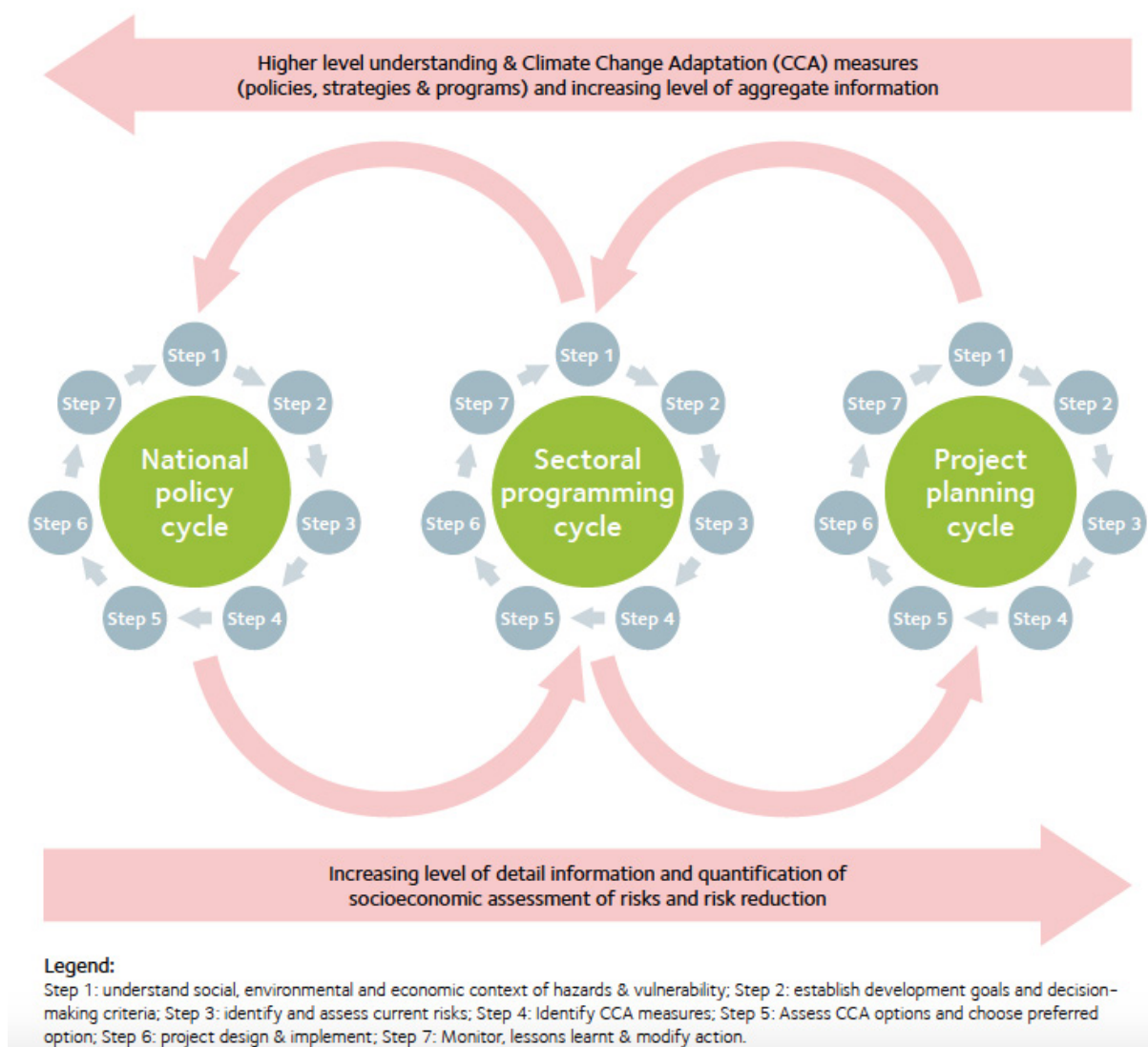
³² Jurgilevich et al, 2017; Barnett, J., and Waters, E. (2016). Rethinking the Vulnerability of Small Island States: Climate Change and Development in the Pacific Islands. In Grugel, J. and Hammett, D. (eds), *The palgrave handbook of international development*, (pp. 731-748). London: Palgrave MacMillan.

³³ Lal, 2012; Jurgilevich et al, 2017

reports on multilateral environmental agreements.³⁴ Multi-stakeholder engagement was a prominent feature in designing adaptation measures by Pacific countries. However, it was observed that government decisions were not always made with risk considerations in mind. Uncertainty surrounding climate change, impacts and adaptation measures, limited baseline information and suitable regionally-scaled climate change models, lack of local capacity in conducting robust technical assessments were noted as challenges to effective decision making in the Pacific.

Based on the observations from the region, the IUCN proposed a seven step stakeholder-based hybrid science- and vulnerability-based approach to decision making for Pacific countries. This approach focuses on knowledge-based adaptation decisions that use both quantitative and qualitative methods to understand the determinants of vulnerability and incorporate context-specific integrated analysis of climate risks and adaptation measures. The approach explicitly links policy, programming and project planning cycles in which information requirements and knowledge generated from the assessment (i.e. technical assessments and stakeholder consultation) flow from one cycle to the other (see Figure 3). The approach has two distinguishable features: a focus on the collective knowledge generated from technical, economic and social assessments at each step of the decision analysis; and the recognition of the decision context in which climate change risks and adaptation measures are being assessed.

³⁴ Lal, 2012



Source: Lal (2012)

Figure 3. IUCN's stakeholder-based hybrid 'vulnerability-first' approach to climate change adaptation decision making process

The progression towards the application of climate and non-climate information, and technical and localised knowledge for adaptation decision making is necessary in order to properly assess vulnerabilities and evaluate adaptation options. Factors independent of climate change, such as poverty and social inequality, influence the vulnerability of communities and multiply the risks associated with climate change impacts.³⁵ Given the heterogeneity of SIDs and their varied development challenges, a contextualised and nuanced understanding of vulnerabilities as well as adaptive capacity³⁶ is critical to fully appreciate the localised processes of adaptation planning and decision making. Consideration of multi-disciplinary and multi-stakeholder attitudes, needs and knowledge on adaptation is pivotal for integrating adaptation efforts horizontally across climate sensitive

³⁵ Narasimha, D. R., van Ruijven, B.J., Riahi, K., and Bosetti, V. (2017). Improving poverty and inequality modelling in climate research. *Nature Climate Change*, 7, 857-862. doi: 10.1038/s41558-017-0004-x

³⁶ Barnett and Waters, 2016

sectors (e.g. agriculture, water, health) and vertically across administrations (e.g. community, subnational, national, regional and international).³⁷

The climate change problem therefore requires value-framed solutions which cannot be solved exclusively by scientific evaluations, nor can it be addressed through a single generalised adaptation decision making approach that is indifferent to local contexts and circumstances. As a consequence, adaptation decision making requires a synthesis of information from a wide range of sources to underpin a contextualised assessment of adaptation measures by multiple decision makers within a specific setting or development context. The decision makers bring with them their own predispositions, rules and knowledge on what solutions are feasible and appropriate.³⁸ By bringing different perspectives to the decision making table, the co-creation of suitable adaptation pathways is possible.

This more refined and versatile approach to adaptation decision making leads to a greater appreciation of the need to draw upon and assimilate climate and non-climate data and information. Deciding on adaptation measures therefore requires a systematic process for understanding what climate data, information and knowledge is required, and subsequently generated and delivered at each stage of the process. As climate change unfolds, climate risks will continue to change, and so too will the data, information and knowledge on which decisions are based. Accordingly, adaptation decision making frameworks need to be flexible, iterative and themselves *adaptive* to new information³⁹ as it emerges and be attentive to the continuous creation (and recreation) of knowledge as a result of complex interactions between actors involved in the decision making process.

3.5 SUMMARY

The country-driven, gender-sensitive, participatory and transparent approach of NAPs, and the emphasis on the use of best available scientific and socio-economic data and information, in conjunction with local knowledge, is generating demand for climate change-related information by Pacific island countries as they work through stages of the NAP process.

The NAP process presents an opportunity for Pacific island countries to strengthen IKM in support of holistic and integrated adaptation planning and decision making. Understanding how different world views, values, and information and knowledge are used to information decision making, and the localised context in which assessments are undertaken and actions implemented, is an essential starting point. To this end, it is important to begin with a contextualised understanding of the current practice in applying information for adaptation planning and decision making by national government entities and by SPREP as a regional agency supporting member countries with preparing their NAPs. This is achieved through case studies (refer to Appendix: Pacific IKM Case Studies), of which the key findings are synthesised in the next section.

³⁷ Lu, X. (2011). Provision of Climate Information for Adaptation to Climate Change. *Climate Research, Contribution to CR Special 25 'Climate services for sustainable development'*, 47, 83-94.; Dazé, A., Price-Kelly, H. and Rass, N. (2016). *Vertical Integration in National Adaptation Plan (NAP) Processes: A guidance note for linking national and sub-national adaptation processes*. Winnipeg: International Institute for Sustainable Development. Available at: www.napglobalnetwork.org

³⁸ Goddard, R., Colloff, M. J., Wise, R. M., Ware, D., and Dunlop, M. (2016). Values, rules and knowledge: Adaptation as change in the decision context. *Environmental Science and Policy*, 57, 60–69. <https://doi.org/10.1016/j.envsci.2015.12.004>.

³⁹ Linkov, I., Anklam, E., Collier, Z. A., DiMase, D., & Renn, O. (2014). Risk-based standards: Integrating top-down and bottom-up approaches. *Environment Systems and Decisions*, 34(1), 134–137. <https://doi.org/10.1007/s10669-014-9488-3>.

4. KEY FINDINGS OF PACIFIC IKM CASE STUDIES

This section presents key findings from the Pacific IKM case studies, followed by a summary on the application of climate and non-climate information, and types of information used for adaptation planning and specific thematic areas and sectors examined through the situation analysis (i.e. gender and social inclusion, roads infrastructure and coastal management). Full case studies for Tonga, Papua New Guinea, Tuvalu and SPREP are provided in the Appendix.

4.1 NATIONAL ADAPTATION PLANNING APPROACH AND PROGRESS

As demonstrated by the case studies, adaptation planning in the Pacific tends to be aligned with stakeholder-based approaches with a strong focus on qualitative assessments of vulnerability. The use of scenario modelling for national adaptation planning is less common and is likely to be carried out as part of larger projects in conjunction with vulnerability assessments (e.g. coastal management in Tuvalu). Challenges associated with limited availability of the required data and information and analytical capacity, and barriers to information and knowledge management (discussed in Section 4.6, below), may be reasons for the tendency towards vulnerability-centred approaches.

SPREP's support towards adaptation planning is driven by country needs and priorities, which are tied to vulnerabilities and issues identified in respective national climate change and development policies and plans. A convincing rationale on the country's vulnerabilities and adaptation needs is an integral factor in SPREP's decision making and project proposal review process.

Governments are in the initial stages of laying the groundwork for NAP formulation and assessing climate vulnerabilities. Both Papua New Guinea and Tuvalu are applying for funding from the GCF to fund the NAP formulation process, with the GCF decision expected in October this year. SPREP, as an accredited entity to the GCF, has assisted Tuvalu in preparing the funding proposal, while Papua New Guinea has received assistance from UNDP and the NAP Global Support Programme. In comparison, Tonga is slightly advanced as it is using the existing Joint National Adaptation Plan on Climate Change and Disaster Risk Management (Phase 2) as the basis for the NAP. The plan identifies preliminary costing for Tonga's adaptation activities.

National and subnational vulnerability assessments have been completed in all three countries through previous adaptation policy and project planning processes. NAP-specific qualitative vulnerability analysis has been carried out for each island in Tuvalu, with support from the NAP Global Network. In Tonga, initial vulnerability assessments have also been carried out for agriculture and health sectors. While vulnerability assessments differ in methods and techniques, a common characteristic is the qualitative analysis of social, environmental, economic and cultural conditions. These assessments are also used to establishing baselines for adaptation projects.

"An adaptation decision has to be evidence- and science-based, acceptable to the community, comply with national policies - it has to make sense"

Key informant, Climate Change Resilience Programme, SPREP

There is no obvious selection or clearly defined approach to national adaptation planning and decision making among national governments, nor is there an established risk-based framework being used by SPREP to support countries develop NAPs and undertake other adaptation planning processes. LDCs and SIDS are most likely to use the NAP technical guidance issued by the LDC Expert Group, which identifies four interlinked elements of the formulation of NAPs (refer to Table 2).

The case studies show that countries have commenced the NAP process independently of any predefined methods and to some extent, without setting the necessary foundation for NAP formulation. Important activities to be undertaken by countries – and for SPREP to support – at the beginning of a NAP process are information and capacity assessments, including stocktaking of the availability of the data and information needed for evaluating climate change impacts, the vulnerabilities of communities and built assets (among other things) and adaptation options. These activities help to map out information and capability requirements for each stage of the NAP process, and to identify opportunities for knowledge creation and iterative learning.

4.2 DECISION MAKING CONTEXT AND KEY ACTORS

Collaborative and multi-stakeholder decision making processes are regularly applied in countries to guide the adaptation planning process. Papua New Guinea's Adaptation Technical Working Group, Tonga's JNAP2 Taskforce and Tuvalu's National Advisory Council on Climate Change are examples of governance mechanisms that have been established by national governments to strategically guide and coordinate national adaptation actions and consequently influence national adaptation decisions. The multi-stakeholder membership of these mechanisms, including representation from government, private sector and civil society organisations (and subnational authorities in the case of Papua New Guinea) facilitates

collaboration and information sharing, and provides an effective platform for mainstreaming climate change and gender considerations into national and sectoral planning (see Tonga and Tuvalu case studies on gender and social inclusion). Collaborative decision making is also observed in SPREP's adaptation planning processes, and given the mandate of SPREP, its decisions are both strategic and reactive to serve the needs of member countries and territories.

Some countries noted that decision making can be hierarchical as well as collaborative. At the individual agency or departmental level, decision making powers rest with the organisational head who is answerable to the responsible minister. The type of information required by decision makers in the organisational hierarchy varies between countries, with some government leaders being more engaged in accessing climate change information than others (refer to the Tuvalu case study on national adaptation planning).

"A good adaptation decision is decision with more than one person contributing to it and one that has all the information on the table. This is what the JNAP Taskforce does and why the Taskforce is critical to adaptation decision making"

Key informant, DCC, Tonga

"A decision that has direct impact on resilience being built on the communities at the forefront of climate change impacts is a good adaptation decision"

Key informant, CCDA, Papua New Guinea

Climate change is an integral part of national development planning for countries examined in this report and is recognised as an issue affecting all sectors. There are numerous policies and strategies in place in each country that articulate the importance of climate change to sustainable and resilient development. Papua New Guinea and Tuvalu have adopted legislation to implement at a national level their Paris Agreement contributions and commitments on climate change mitigation and adaptation. The mandates of national climate change agencies and related governing and ministerial responsibilities are also stipulated in

the respective legislation.

Identifying key actors and the nature of decision making processes is useful in understanding information needs and how this information is used for adaptation planning and decision analysis. It is evident from the case studies that decisions are being made by different actors for different purposes – i.e. policy, project and sectoral planning, implementation and reporting – but usually done so subjectively without a clearly-defined or agreed decision making criteria.

4.3 APPLICATION OF INFORMATION FOR ADAPTATION PLANNING

The case studies revealed that climate and non-climate information is used for a variety of adaptation related purposes including:

- Policy formulation and analysis;
- Project planning (developing a project proposal, design or concept note);
- Resilience planning (adaptation, mitigation and disaster risk management, including vulnerability assessments);
- Climate action (project implementation, monitoring and evaluation); and
- Communication and reporting (including reporting requirements for the UNFCCC and Multilateral Environmental Agreements).

Modelling, forecasting and technical analyses are carried out depending on project/policy, expertise and assistance available. The information then flows to various layers within national government to inform decision making processes.

Figure 4 illustrates the current approach to applying information for adaptation planning and decision making by national climate change agencies in Papua New Guinea, Tonga and Tuvalu.

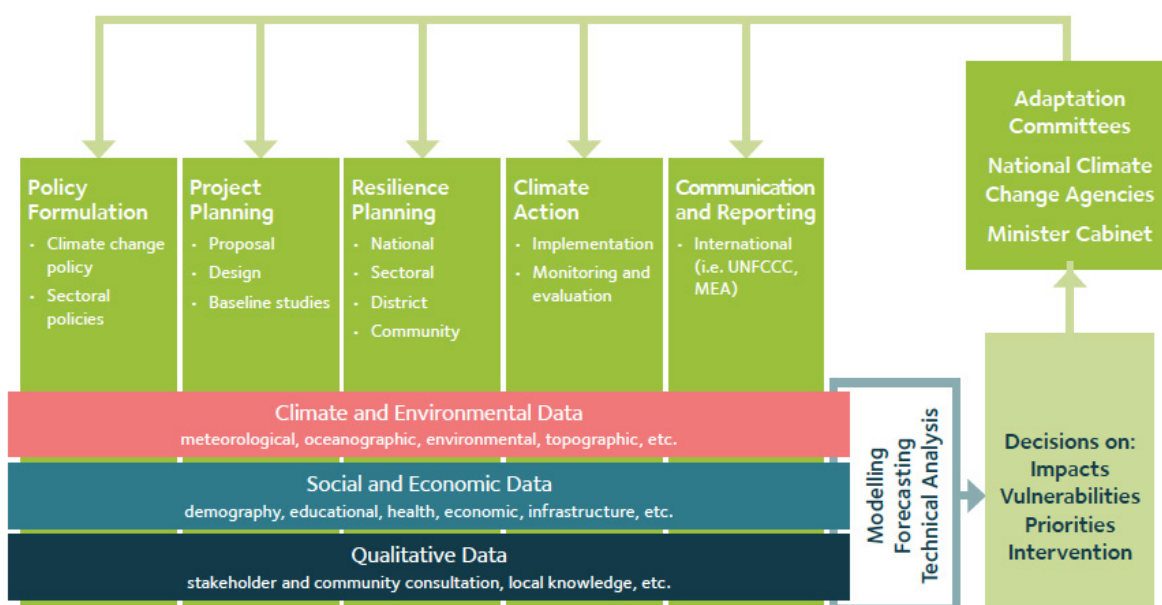


Figure 4. Application of information for adaptation planning and decision making: Papua New Guinea, Tonga and Tuvalu

SPREP's use of information follows a typical project planning cycle with early stages of the cycle relying on baseline data for countries and if available, climate forecasts and projections, and technical reports. For the latter stages of the cycle, (implementation through to evaluation), climate and non-climate information needs vary between projects. The decision making process involves country stakeholders, SPREP's senior management team and Project Management Review Group as well as other relevant decision makers depending on the issue or project being considered. SPREP's use of information for adaptation planning and decision making is shown in Figure 5.

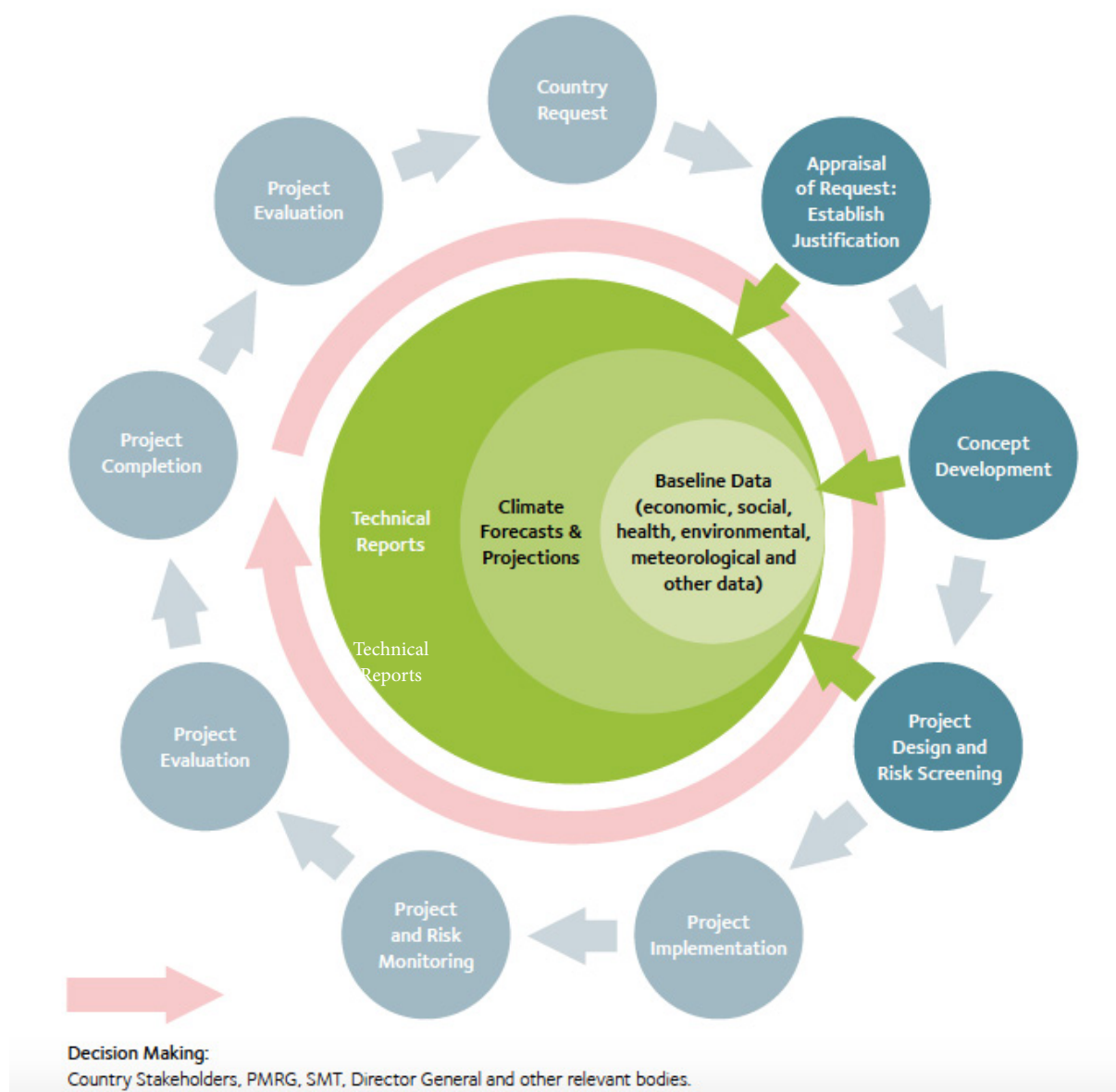


Figure 5. Information requirements for initial stages of SPREP's adaptation planning support to countries

The case studies indicate that meteorological data, including historical climate observations and data on temperature, rainfall and sea level, is the most commonly used climate-related data used for adaptation planning. These data are freely and readily available from national meteorological services, and information products such as climate briefs and outlooks are widely disseminated to national government agencies and to the public through government and media channels. The case studies cited the Australian Bureau of Meteorology, Commonwealth Scientific and Industrial Research Organisation (CSIRO) and New Zealand National Institute for Water and Atmospheric Research (NIWA) as key agencies providing technical support on climate modelling and forecasting.

Except for Tonga, national meteorological services do not generate their own climate projections, but instead access projections produced through the Australian Government funded Pacific Climate Change Science Program. However, these projections are eight years old and need revision to incorporate the latest scientific information, climate models and baseline data. Presently, adaptation decisions by national climate change agencies are being made with no or limited projections on future climate scenarios relevant to each country. The case studies indicate that external support is being provided to meteorological services in the Pacific to improve the delivery of climate information services. The Tuvalu Meteorological Service is producing a variety of climate information products with the assistance from the Australian Bureau of Meteorology. In Papua New Guinea, the National Weather Service is currently using the CLiDEsc, a climate analysis and product generation software developed by NIWA, to prepare customised climate datasets for different sectors. Enhancing climate modelling expertise of national meteorological services and their engagement in adaptation planning is vital for NAP formulation and implementation.

“A good adaptation decision is one where we know we have good data for consideration in the adaptation process and can clearly identify adaptation measure with minimal or no maladaptation”

Key informant, DCCD, Tuvalu

A wide range of non-climate information is collected and used by countries as shown in Table 4. In all case study countries, demographic data from census reports produced by national statistics office was used extensively by national climate change agencies and other government departments (i.e. gender affairs, public works).

Table 4. Data categories and information sources used by national climate change agencies in Papua New Guinea, Tonga and Tuvalu

Categories of data used		
Agricultural	Geographic (coastal and mountain)	Oceanographic
Demographic	Geomorphological (topographic and bathymetric)	Property
Economic	Health	Social (gender, education, migration, cultural)
Energy and Emissions	Hydrological	Seismic
Environmental	Infrastructure	
Financial	Meteorological	
External sources of climate change information		
Australian Bureau of Meteorology	National Institute of Water and Atmospheric Research (New Zealand)	Pacific Risk Information
Climate Analytics	Pacific Community (SPC)	SPREP
Commonwealth Scientific and Industrial Research Organisation (Australia)	Pacific Climate Change Portal	UNFCCC
IPCC	Pacific Meteorological Council	University of the South Pacific (USP)

Other categories of data, as indicated in Table 4, were used to develop the narrative for project proposals and national communications, baseline and vulnerability analysis, and other project-specific technical assessments. These types of information were sourced from government departments, regional organisations (e.g. SPC, SPREP, USP) and research institutions in the region (e.g. NIWA and CSIRO). Qualitative information is obtained through stakeholder and community consultations, which are undertaken extensively by all countries and SPREP. Reports and publications from external sources, including the IPCC, UNFCCC, Climate Analytics and the Pacific Climate Change Portal were also used by technical staff and decision makers in national government.

Some agencies reported undertaking their own primary data collection. For example, DCCD in Tuvalu has conducted property audits and has a comprehensive database on every property in the country to inform funding allocation for post-disaster rebuilding and repair works. Papua New Guinea's CCDA has a memorandum of understanding with government departments and private entities to collect raw data required for compiling the greenhouse gas inventory for the UNFCCC national communication reports. In Tonga and Tuvalu, bathymetric and topographic data from the Light Detection Ranging (LiDAR) surveys are available and are treated as valuable information assets to inform adaptation and other sectoral planning.

4.4 APPLICATION OF INFORMATION FOR GENDER AND SOCIAL INCLUSION

The case studies indicate project- or policy-specific application of gender and social information for adaptation planning. Demographic data and socio-economic information are used to compile descriptive narratives for funding proposals, project reports and baseline studies. Detailed analysis on vulnerabilities and adaptive capacities is scarce and typically carried out by consultants or with external assistance. This is also applicable to SPREP with greater resourcing required to implement its Gender Policy and systematically incorporate gender and social assessments into all core programmes and SPREP supported projects.

Age and sex disaggregated data is inconsistently collected by national climate change agencies and gender departments. Typically, projects collect and report on the gender breakdown of participants who attend consultations, training and workshops as part of donor funding requirements. Demographic data from the national census is most commonly used by national agencies for project baselines and reporting by age and sex, however the census data may be incomplete or out of date.

"A good adaptation decision is a decision that has input from all sectors and from men and women"

Key informant, CCDA, Papua New Guinea

In Tonga and Tuvalu, national gender departments are involved in adaptation decision making through their participation in national climate change governance bodies. Representatives from national gender departments use these bodies as an opportunity to share information and impart knowledge on gender and social issues, and how they relate or exacerbate climate change vulnerabilities.

Given these positive findings, a more systematic process for gathering, measuring, applying and disseminating gender and social information would be beneficial in helping better inform NAPs and resilience planning in all sectors.

4.5 APPLICATION OF INFORMATION FOR COASTAL MANAGEMENT AND ROAD INFRASTRUCTURE PLANNING

For coastal management in Tuvalu and road infrastructure in Papua New Guinea, the application of climate and non-climate information is varied. In Tuvalu, previous efforts on coastal protection have been small-scale, short-lived and ineffective due to limitations of available funding. The Tuvalu Coastal Adaptation Project (TCAP), implemented by the Government of Tuvalu and UNDP, with funding from GCF, is well resourced to collect and acquire scientific and non-scientific data (i.e. bathymetric and topographic data, coastal hazards, socio-economic conditions) and undertake detailed assessments. Climate projections and technical information are being used to identify design alternatives for coastal protection. The information and knowledge produced from TCAP is relevant and 'reusable' for other adaptation planning purposes.

In Papua New Guinea, the use of climate change information for 'climate-proofing' roads infrastructure is still in its infancy. Recently, the Flood Estimation Manual was revised and updated using historical rainfall data and available information on future climate. Despite this, underlying challenges including poor availability of data and weak information management practices, restrict the application of climate change information for decision making and resilience planning for roads management.

4.6 CHALLENGES IN APPLYING INFORMATION

Although a wide array of data and information is being collected and applied, challenges remain at the national level. For the purpose of the case study synthesis, these are framed as barriers to IKM and can be characterised into the following categories:

- **Policy barriers:** deficiency in government or institutional policy environment;
- **Institutional barriers:** a lack of institutional leadership, supportive culture and partnerships;
- **Operational and human resource barriers:** absent or weak formal processes, procedures and resourcing;
- **Information and communication technology barriers:** concerning technological and infrastructure limitations; and
- **Skills and capacity barriers:** a lack of technical skills and capacity.

The first four categories of barriers were previously defined in the first phase of the Pacific iCLIM Project.⁴⁰ The last category ('skills and capacity barriers') has been added to capture skills-related issues identified in the case studies. This category is distinguished from 'human resource' barriers, with the latter referring to staff resourcing rather than staff skills and technical capacity.

Challenges identified from the case studies and their implications on adaptation decision making are summarised in Table 5. Unless otherwise indicated, challenges identified are generalised for all sectors and entities examined in the case studies.

Table 5. Challenges to application of information for adaptation decision making and implications identified in case studies

Type	Challenge	Implications on adaptation decision making
Policy	<ul style="list-style-type: none"> ▪ Gender policy actions not implemented or properly resourced (SPREP) 	<ul style="list-style-type: none"> ▪ Gender indicators and gender analysis conducted in an ad hoc manner and informing decisions at project and programme level only
Institutional	<ul style="list-style-type: none"> ▪ Organisational culture on data sharing is non-existent or embryonic 	<ul style="list-style-type: none"> ▪ Decisions are made knowingly or unknowingly with absence or limited availability of relevant data
	<ul style="list-style-type: none"> ▪ Lack of formal arrangements between agencies that require information sharing, which also contribute to duplication in data collection 	<ul style="list-style-type: none"> ▪ Limited information acquired for decision analysis ▪ Unreliability of information collected
Operational and human resources	<ul style="list-style-type: none"> ▪ No formalised practice and procedure of record keeping and documentation 	<ul style="list-style-type: none"> ▪ Decisions are made with limited information and not substantiated by evidence
	<ul style="list-style-type: none"> ▪ Inconsistency in data collection and use of varied methods, stemming 	<ul style="list-style-type: none"> ▪ Data used for single purpose and not reused, or consistently collected over a

⁴⁰ Mackay, S., Brown, R., Gonelevu, M., Pelesikoti, N., Kocovanua, T., Iaken, R., Iautu, F., Tuiafitu-Malolo, L., Fulivai, S., Lepa, M., and Mackey, B. (2019). Overcoming barriers to climate change information management in small island developing states: lessons from Pacific SIDS. *Climate Policy*, 19(1), 125-138. doi: 10.1080/14693062.2018.1455573

Type	Challenge	Implications on adaptation decision making
	from absence of operational procedures and guidelines, and non-collaborative data collection between departments	long period of time to inform adaptation decisions
	<ul style="list-style-type: none"> ▪ Lengthy process of acquiring data from other government departments 	<ul style="list-style-type: none"> ▪ Decisions being made without the required data ▪ Delay in decision making
	<ul style="list-style-type: none"> ▪ No procedures established for filling information gaps identified in country proposals/request for assistance (SPREP) 	<ul style="list-style-type: none"> ▪ Excessive time spent in searching for information, delaying decisions or decisions made without sufficient information
	<ul style="list-style-type: none"> ▪ No formalised practice and procedure of record keeping and documentation 	<ul style="list-style-type: none"> ▪ Decisions made without a documented evidence or logic
	<ul style="list-style-type: none"> ▪ No budget and staffing resources allocated to operationalise gender policy (SPREP) 	<ul style="list-style-type: none"> ▪ Decisions are informed by gender analysis in an ad hoc manner and only at the project level, and not sustained beyond specific adaptation projects
	<ul style="list-style-type: none"> ▪ Limited understanding of information users and needs 	<ul style="list-style-type: none"> ▪ Information not relevant, not in a format or language required for decision making purpose
Information and Communication Technology	<ul style="list-style-type: none"> ▪ No central repository or integrated information management system in place 	<ul style="list-style-type: none"> ▪ Information is not readily accessed or 'discovered' by users when they need it
	<ul style="list-style-type: none"> ▪ No backup or secure storage of information, risking permanent loss of information 	<ul style="list-style-type: none"> ▪ Decisions made with limited information
	<ul style="list-style-type: none"> ▪ Project information management system is cumbersome and time consuming to populate/update (SPREP) 	<ul style="list-style-type: none"> ▪ Decisions are not informed by knowledge and lessons learned from previous projects
Skills and capacity	<ul style="list-style-type: none"> ▪ No or limited in-country expertise in climate modelling 	<ul style="list-style-type: none"> ▪ Climate projections and impact scenarios rarely used to inform adaptation decisions
	<ul style="list-style-type: none"> ▪ Data collected but not analysed or used for detailed technical analysis due to lack of skills and capability 	<ul style="list-style-type: none"> ▪ Decisions not informed by rigorous and robust analysis

The challenges concerning key aspects of IKM - policy, institutional, operational and human resources, technology, and skills and capacity - need to be addressed by national governments and recognised by SPREP in the early stages of the NAP process to understand information requirements of countries and to enable effective decisions to be made (and refined) in the subsequent stages.

4.7 OPPORTUNITIES AND GOOD PRACTICE

In addition to the challenges, the case studies also identified current good practice in IKM and the application of information to adaptation decision making. Affirmative steps are being taken by countries to recognise and better manage and utilise climate change information such as: simple solutions for sharing climate change negotiation outcomes among government personnel in Tonga; reusing data for various adaptation planning initiatives in Tuvalu; and delineating IKM as a strategic outcome for corporate planning in Papua New Guinea.

Key opportunities that are relevant for all Pacific states and territories include:

- The development of national climate change portals through the Pacific iCLIM project enables increased accessibility, discoverability, use, reuse and dissemination of climate change information, and is a useful information hub for the formulation of NAPs. The national portals need to be updated as new information is produced through the NAP process. The national portals are linked to SPREP's Pacific Climate Change Portal, thus further enhancing discoverability of information.
- Increased capacity of national meteorological services in the Pacific in undertaking climate forecasting and scenario modelling with support from development partners including DFAT, the Australian Bureau of Meteorology, CSIRO, NIWA and the World Meteorological Organisation. As a result, customised climate information products can be produced to meet the information needs of different users. Other key actors in adaptation planning would benefit from skills and knowledge transfer in climate modelling to better incorporate science into decision analysis on adaptation.
- The potential role of the PCCC in coordinating and managing climate change information and research in the Pacific to enable countries better plan for and implement adaptation actions. The uncertainty of climate change and the rapid technological advancements necessitate ongoing research on adaptation issues that draws on a combination of latest climate science, local knowledge and best available information.
- The emerging role of national climate change agencies and SPREP in brokering information and generating knowledge on adaptation, respectively at national and regional levels. Mutual exchanges and learning from national and regional information brokers in the Pacific would further refine adaptation decision making approaches that are versatile and themselves adaptable to new information and knowledge.

4.8 SUMMARY

It is apparent that, in addition to the climate science and projections required to assess risk and vulnerability, the decision making frameworks being utilised in the Pacific for adaptation planning have influenced an increasing trend towards multi-stakeholder values-based assessment.

There are diverse applications of climate and non-climate information for adaptation planning in the Pacific. The information is used within a wider decision making context involving many different actors at different levels. The decisions are ultimately seeking to manage climate change risks through achieving reduction in the vulnerability and exposure of communities and assets to climate-related hazards, as well as enhancing the overall resilience of natural and human systems. From a global perspective, these holistic values-based adaptation planning processes are consistent with emerging best practices.

Challenges pertaining to IKM remain as significant barriers to well-informed and agile adaptation decision making. These barriers need to be addressed by countries and SPREP to ensure the NAP process is strongly supported by institutional policies, procedures, leadership, technology, resourcing and expertise. Current good practices in IKM, as indicated by the case studies, are a promising sign and further efforts are needed at national and regional levels to improve IKM practice.

5. CONCLUSION AND KEY CONSIDERATIONS

It is clear from the situation analysis that a broad range of climate and non-climate related data and information is required to enable decisions that catalyse pragmatic climate action. Section 3 of this report highlighted the emergence of a new refined framework of decision analysis in the Pacific region that draws on: climate and other scientific data about current and future physical environmental conditions; data and information about critical socio-economic considerations including gender; data on built assets and related infrastructure; along with expert, practical and traditional and local knowledge. Their use leads to more holistic and values-based decision making. The results of the situation analysis synthesised in the Pacific IKM case studies (Appendix) and the summary of findings in Section 4 underscore the context in which adaptation decisions are being made, in particular the presence of diverse actors in contributing to the adaptation and sectoral planning processes.

Looking ahead, an important consideration for the NAP process is how to strike the right balance between rigour and applicability of scientific and non-scientific information, in order to ultimately turn adaptation assessment and decisions into meaningful actions. Greater financial and technical support will be required by Pacific island countries to identify information requirements, the quality and robustness of information, and to ensure proper IKM systems and processes are in place. This includes capacity building on managing and applying complex and large volumes of climate and non-climate information generated through the NAP process to help transform this information into knowledge that can be applied to better inform adaptation decisions.

5.1 KEY CONSIDERATIONS

The findings of the situation analysis provide guidance on **key considerations** for new and renewed investments in IKM and adaptation planning in the Pacific region. These include:

- **Continued improvement of information management systems:** The complexity of climate change information and technological advancements necessitates ongoing investment and improvements in national and regional systems to increase accessibility, discoverability, use, reuse and dissemination of climate change information.
- **Regional knowledge brokering capacity:** Regional bodies (like SPREP) have a key role in coordinating and managing climate information and research in the Pacific. The information needs of countries to effectively plan for, implement and sustain adaptation actions require dedicated resourcing of regional bodies to fulfil their knowledge brokerage role and to deliver timely and credible information services to member countries and territories.
- **Support to national agencies:** National climate change agencies have a critical role to play in brokering information and generating localised knowledge on climate change as well as gender dynamics and socio-economic and environmental conditions. Development assistance and technical support should target improving information and knowledge management skills and capacity within government institutions, with a wider contextual focus on how information and knowledge is created, used and shared in each country.
- **Community of practice:** There is an opportunity to bolster the regional network through peer-to-peer learning to share IKM lessons and approaches, including through formal regional governance arrangements such as the Pacific Resilience Partnership. Regional bodies like SPREP are instrumental in facilitating and supporting knowledge sharing and communities of practice on climate change.
- **Partnerships on applied research:** Countries need support in balancing rigour and applicability of scientific and other data and information, and in managing knowledge development processes. A more systematic process for stocktaking, gap filling, assembling, applying and disseminating information is necessary for informing NAPs and resilience planning in all sectors to help countries make informed decisions. Applied research is needed to assist countries assess climate risks and identify robust adaptation actions using the best available data and information.
- **Investment in capacity of meteorological services to communicate scientific data and information on climate-related conditions and hazards:** Capacity of national meteorological services in the Pacific has

improved through support from development partners. Investment should continue to increase the expertise and capacity of national meteorological services to generate country-specific climate projections and undertake forecasting and modelling to meet the needs of different users.

- **Further investment in non-climatic data and information:** Greater investment is also needed to ensure the additional non-climatic data and information required for adaptation planning and decision making is available, including a systematic process for gathering, measuring, applying and disseminating gender and social information.

5.2 INFORMATION AND KNOWLEDGE MANAGEMENT WORKFLOW GUIDELINE

Based on the findings of the situation analysis, an information and knowledge management **workflow guideline** has been developed to assist organisations scope information requirements and knowledge management processes for adaptation decision making (refer to Figure 6).

The guideline, represented by a visual IKM 'wheel', can be applied to any decision making framework (and to any steps within the framework) discussed in this report as well as others, policy/project/program planning cycle – and all steps in the cycle – and elements of NAP process. Regardless of what framework or approach is used, the IKM wheel is intended to guide the process of decision analysis.

The IKM wheel consists of seven interconnected cogs or steps – *plan, create, capture, store & secure, apply, share* and *reuse* – and corresponding set of guiding questions (refer to Table 6). Surrounding the core of the wheel are key enablers for successful IKM, which include: policies, procedures, technology and people.⁴¹ The wheel connects information and knowledge making processes to assist organisations explicitly identify and understand the stages of knowledge management: knowledge creation; knowledge processing and application; and knowledge exchange and discovery. These stages entail:

- **Knowledge creation:** the first two steps – plan and create - in IKM for adaptation decision making helps define the context in which decisions are being made and what information is needed to make these decisions. Essentially these first steps are the who, what, when and why of information required for decision making. By going through these steps, those involved in the adaptation decision making process are establishing the foundation for turning information into knowledge.
- **Knowledge processing and application:** through the steps capture, store & secure, and apply, data and information gathered in the previous steps are authenticated, processed and applied using relevant tools, methods and skills. These steps are essential for making sense of the information and translating it into useful and usable format for policy making and action.
- **Knowledge exchange and discovery:** the final steps of share and reuse enable greater dissemination of information created through the decision making process by presenting it to a wider audience for application and learning, for and beyond the initial purpose for which the information was created. This facilitates exchanges in thinking and understanding between actors about how the information can be applied, thus creating a space for discovery and innovation, and generating new information and knowledge.

A knowledge broker plays a key role in linking the stages of knowledge creation, knowledge processing and application, and knowledge exchange and discovery, within the broader framework of IKM (*plan, create, capture, store & secure, apply, share* and *reuse*) and decision analysis.

The IKM wheel can be used by any organisation (at all levels) to critically analyse and understand the context in which decisions are made, what information inputs and management processes are required, how information

⁴¹ Griffith University and SPREP (2016). *Information and Knowledge Management for Climate Change (IKM4CC) Strategic Framework: Guidelines for the Pacific Region*. Griffith University, Brisbane.

influences adaptation decisions, and how knowledge generated as a consequence of decision analysis can be captured and fed back into next or future sequence of decision making.

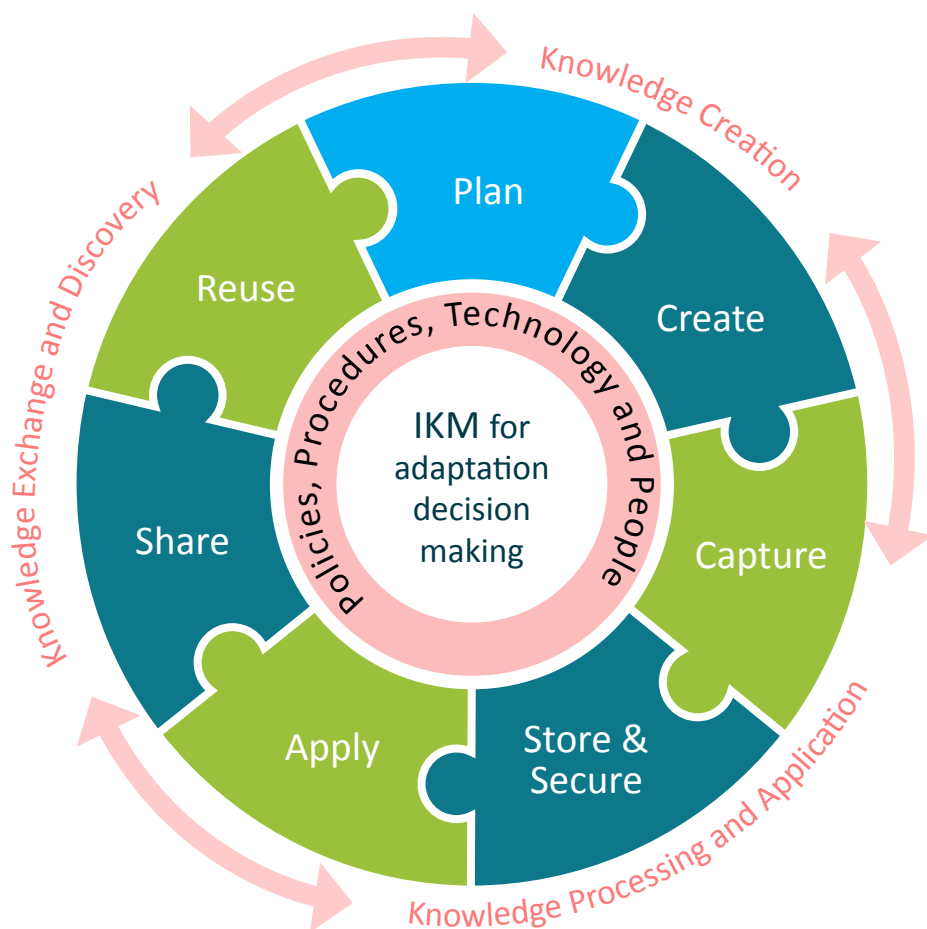


Figure 6. Information and knowledge management wheel for decision making

Table 6. Guiding questions for the IKM wheel

Guiding questions for each step
1. Plan <ul style="list-style-type: none"> What is the problem being considered? What are the underlying issues associated with the problem? What decision needs to be made? What are the objectives of decisions? Who will contribute to decision making? What values, rules and knowledge do decision makers have? Who will ultimately make the decisions? What criteria will they use to make the decisions?
2. Create <ul style="list-style-type: none"> What information is needed for decision making? Where do you source the information? Who holds this information? Is the information already available? Do you need to acquire/collect the information?
3. Capture <ul style="list-style-type: none"> What format and language is the information in? Is the information reliable and accurate? Is the information from a credible source? Is the information up to date? Is the information recorded or captured in metadata?
4. Store and Secure <ul style="list-style-type: none"> How will you securely store the information? How will you protect the information? Is the information backed up? Who has access to the information? What formats should the information be saved?
5. Apply <ul style="list-style-type: none"> What tools and methods are needed to analyse the information? Are these tools and methods available or do they need to be acquired? What spatial and temporal scales are required for the analysis? What skills and expertise are needed? Are these skills available in-house? Can skills be enhanced or transferred through external support?
6. Share <ul style="list-style-type: none"> Does the information have a wider application and audience/users? How will the information be used by others? What can we collectively learn from the information? What relationships can be established or strengthened through sharing this information?
7. Reuse <ul style="list-style-type: none"> Can existing and past information be used? Is the existing information compatible with other tools and methods? Is the information replicable to other geographic areas or sectors? What lessons have been learned from using this information? Has the information led to good decisions or maladaptation?

APPENDIX: PACIFIC IKM CASE STUDIES

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INTRODUCTION

The situation analysis focuses on three Pacific governments participating in the Pacific iCLIM Project, Papua New Guinea, Tonga and Tuvalu, and one regional organisation, the Secretariat of the Pacific Regional Environment Programme (SPREP). The methodology used for the situation analysis involved a literature review, key informant interviews and a self-administered online questionnaire. The findings of these comprehensive interviews and questionnaires were synthesised into case studies focusing on national adaptation planning and gender and social inclusion. Additional sectors – roads infrastructure and coastal management – were examined for Papua New Guinea and Tuvalu respectively.

Each case study examines (i) the **context** of decision making, (ii) how climate change information is used, **information types and sources**, and (iii) the current **challenges and opportunities** to provide a holistic insight into how national and regional Pacific organisations source, manage, use and share climate change data, information and knowledge. Insights on good approaches, projects and practices have been captured and are detailed in ‘boxes’ throughout the case studies.

SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME

The Secretariat of the Pacific Regional Environment Program (SPREP) is a regional organisation charged with promoting environmental protection and sustainable development in the Pacific. It has four core programming areas: climate change resilience, environmental monitoring and governance, island and ocean ecosystems, and waste management and pollution control.⁴¹ Two case studies have been compiled for SPREP which examine how climate change information is being used for supporting Pacific countries in the areas of national adaptation planning and gender and social inclusion.

National Adaptation Planning

The Context

SPREP is supporting member countries to access Green Climate Fund (GCF) assistance for the development of National Adaptation Plans (NAPs). It provides technical support to countries in applying for the GCF's Readiness and Preparatory Support Programme, which offers up to US\$3 million per country towards their NAP formulation and development of country-led adaptation planning processes.⁴²

As an accredited entity of the GCF, SPREP can develop funding proposals, and manage and monitor GCF-funded projects for countries in the region.⁴³ There are restrictions on the projects that SPREP can manage: they must have minimal or no adverse environmental and social risks, and not exceed the combined cost of US\$250 million.

As at July 2019, Pacific countries were yet to successfully access funds from the GCF Readiness and Preparatory Support Programme to fund NAP formulation. In response, SPREP has been proactive in offering technical support to countries in preparing their funding proposals. One event organised for this purpose was the NAP 'writeshop', held in May 2019 at the SPREP office in Apia, Samoa. Funded by the IMPACT Project⁴⁴, the writeshop provided dedicated support to country representatives in developing NAP concept notes and proposals. To help countries reach the stage of being 'submission ready', topics covered in the writeshop included benefits and requirements of GCF funding, theory of change, concept and proposal development, and proposal submission. The writeshop encouraged peer-learning among representatives and sharing of experiences in proposal writing. The writeshop was attended by 18 participants from Marshall Islands, Kiribati, Niue, Palau, Samoa, Solomon Islands, Tuvalu and Vanuatu.

One country nearing the 'submission ready' stage is Tuvalu. In late 2018, SPREP commenced its proposal development support to the Tuvalu Government Department of Climate Change and Disaster (DCCD). Following an in-country stakeholder workshop and ongoing support from SPREP's Climate Resilience Programme and Project Coordination Unit, Tuvalu's NAP proposal will be submitted for consideration by the GCF Board at its meeting in October 2019.

Notwithstanding the initial low uptake of GCF funding for NAP formulation, there has been a proliferation of climate change adaptation projects in the Pacific region. SPREP's support for national adaptation planning is driven by country need and the adaptation priorities stipulated in national policies, the Nationally Determined Contributions (NDCs) and other relevant plans of member countries. Forums and mechanisms such as the Conference of Parties of the United Nations Framework Convention on Climate Change (UNFCCC), GCF regional dialogue, the Climate Action Pacific Partnership meeting held in May 2019 in Fiji, along with many other regional

⁴¹ SPREP Strategic Plan 2017-2026. More information available at: <https://www.sprep.org/publications/sprep-strategic-plan-2017-2026>

⁴² GCF Board decision B.13/09

⁴³ For more information on GCF regional accredited entities, refer to: <https://www.greenclimate.fund/how-we-work/tools/entity-directory>

⁴⁴ The IMPACT Project is a three year multi-regional project funded by the German Ministry of Environment (2016-2019). In the Pacific region, the project is implemented by SPREP with support from Climate Analytics. More information is available at: <https://climateanalytics.org/projects/impact-climate-action/>

and bilateral meetings, and the SPREP Director General's country missions are used by SPREP to inform its understanding of the diverse circumstances and adaptation needs of countries.

How Climate Change Information is Used

Climate change information is crucial to the proposal and project assessment process undertaken by SPREP's Project Management Review Group, which comprises technical officers across the organisation. The information is used to understand country needs, vulnerabilities and priorities, which in turn aides in defining the problem that the proposal or project is trying to address. The decisions of the Project Management Review Group are submitted to SPREP's Senior Management Team, comprised of directors and programme heads, and then to the Director General for final review and endorsement. In this way, SPREP uses collective decision making and its decisions can be both reactive (responding to country issues as they arise) and strategic (intentional planning to address country needs).

Proposals for new adaptation projects are reviewed by the Project Management Review Group using multi-assessment criteria based on environmental, social, economic and governance risks, and resourcing and funding considerations. In addition, proposals are reviewed on how they contribute to resilience and livelihoods of communities. Where available, climate change projections for the country are used with baseline information to identify climate change vulnerabilities, and assess how the proposed project will reduce these vulnerabilities and enhance adaptive capacity. The baseline information also assists with screening for potential environmental and social impacts associated with the project.

Proposals to the GCF, Global Environment Facility (GEF) and Adaptation Fund undergo a due diligence check by SPREP to ensure compliance with fiduciary and safeguard requirements. This entails checking for necessary evidence of legal and policy compliance, stakeholder consultation, scientific and technical assessment, and environmental and social risk appraisal. SPREP can only submit proposals that demonstrate full compliance with these requirements.

In regard to SPREP's role in delivering information to member countries, there are a number of online systems which support dissemination of important regional, national and project related information on climate change, including the Pacific Climate Change Portal and INFORM Project suite of environment data portals (see Box 2).

Box 2. SPREP Information Portals

Pacific Climate Change Portal (PCCP): The PCCP is a regional online gateway and repository of climate change news and information in the Pacific. The PCCP is maintained by SPREP with technical support from Griffith University as part of the Pacific iCLIM Project (2014-2019). The PCCP has an average monthly traffic of 3,300 visits, mainly from the United States, Fiji, Australia and New Zealand. The PCCP contains country profiles, project resources, news and events and decision support tools for climate finance and adaptation project planning. Resources uploaded to the PCCP are accompanied by metadata including key words and information categories to improve the search function of the portal based on an agreed regional climate change 'vocabulary'. Notably, the PCCP links to a suite of national climate portals. SPREP personnel noted frequently using the PCCP and find it a useful tool to access country information and reports. URL: www.pacificclimatechange.net

INFORM Project Environment Data Portals: SPREP personnel also uses the regional and national environmental portals established through the INFORM Project to guide their planning and decisions on climate change and environmental projects. The INFORM Project seeks to provide countries with reliable access to environmental datasets and information and assist them in implementing systems and standards for information usage. The portals are intended to help countries monitor, evaluate and analyse environmental information for reporting requirements under the Multilateral Environmental Agreements. URL: www.sprep.org/inform

Information Types and Sources

A wide variety of data and information is used by SPREP personnel to establish country adaptation planning needs (refer to Table 7). The data is used for establishing project baseline and rationale, and for scoping potential

environmental and social risks. Climate forecasts and projections are used for validating climate change vulnerabilities and to inform the design of adaptation projects.

SPREP personnel indicated that the common sources of climate change and associated environmental information are the PCCP⁴⁵, INFORM environmental portals⁴⁶, and the UNFCCC and Intergovernmental Panel on Climate Change (IPCC) websites (see Table 7). SPREP personnel also noted using data and reports published by the IPCC, Climate Analytics, Pacific Community (SPC), Pacific Meteorological Council (which includes forecasts and projections produced with technical support from the Australian Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation), and the New Zealand National Institute for Water and Atmospheric Research (NIWA). SPREP does not produce its own climate change forecasts and projections, however these are generated at the country level through regional programs being implemented by SPREP in partnership with key meteorological and scientific institutions in Australia and New Zealand.

Table 7. Data Categories and Information Sources used by SPREP

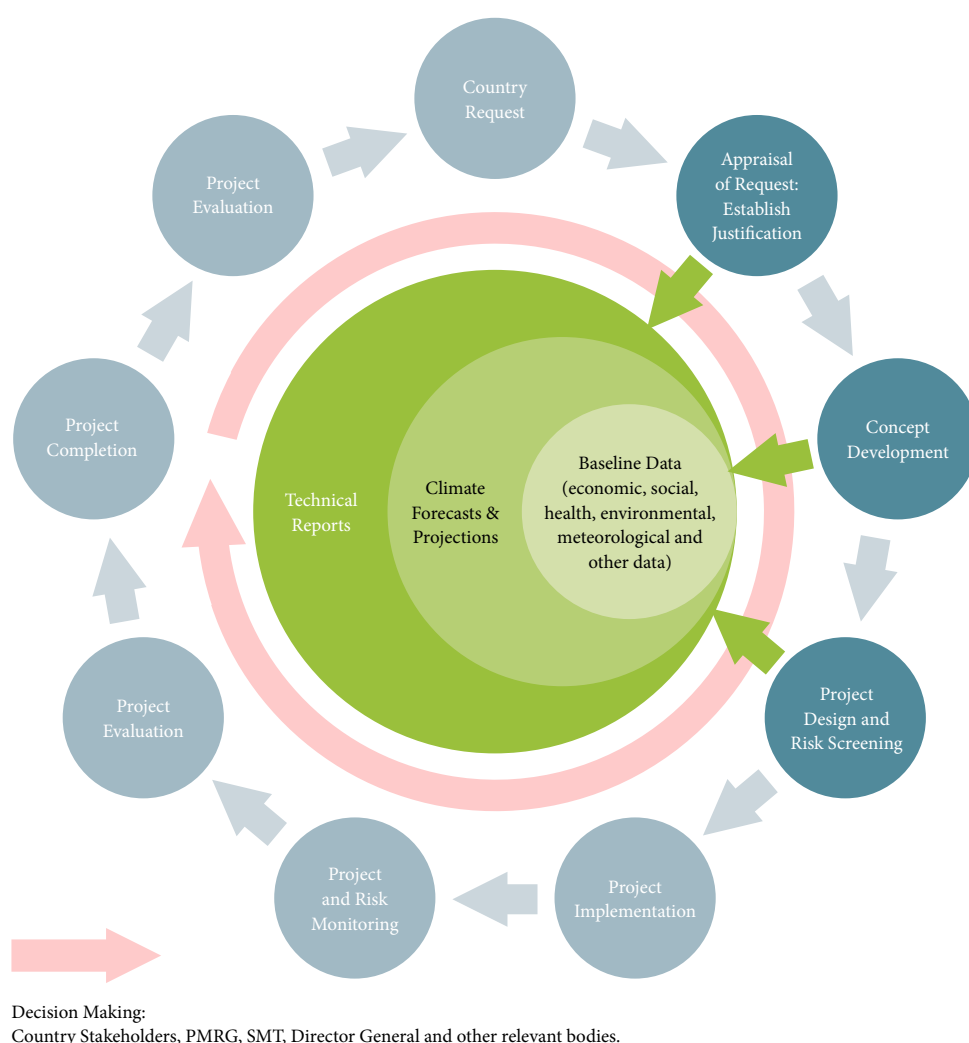
Categories of Data Used		
Demographic	Financial	Infrastructure
Economic	Geographic (coastal and mountain)	Meteorological
Energy and Emissions	Geomorphological (topographic and bathymetric)	Property
Environmental	Health	Social (gender, education, cultural)
Climate Change Information External Sources Used		
Australian Bureau of Meteorology	Intergovernmental Panel on Climate Change	Pacific Climate Change Portal
Climate Analytics	National Institute of Water and Atmospheric Research (New Zealand)	Pacific Meteorological Council
Commonwealth Scientific and Industrial Research Organisation (Australia) (CSIRO)	Pacific Community	UNFCCC

In addition, where available, SPREP personnel use technical reports such as vulnerability assessments and cost benefit analyses for project design and risk screening. Often, SPREP personnel can obtain concept notes, proposals, mid-term and terminal evaluation reports from previous multilaterally-funded adaptation projects (i.e. GEF, United Nations Development Programme (UNDP)) through online sources, however other project documentation is more difficult to find and requires the assistance of partner countries and organisations. Figure 7 depicts the type of information SPREP uses and how it feeds into the early stages of SPREP's adaptation project planning cycle. For the later stages of the cycle (implementation through to evaluation), climate data and information needs vary between projects.

⁴⁵ As at July 2019, SPREP was in the process of recruiting a knowledge management officer under the Pacific Adaptation to Climate Change and Resilience Building (PACRES) project. This officer will manage and update the content of the PCCP. The PACRES project aims to enhance regional and national action on adaptation and mitigation. The project is funded under the European Union's 11th European Development Fund Intra-African Caribbean Pacific Global Climate Change Alliance Plus (GCCA+) Programme and runs from 2018-2023.

⁴⁶ The INFORM Project's full title is "Building National and Regional Capacity to Implement Multilateral Environmental Agreements by Strengthening Planning and the State of Environmental Assessment and Reporting in the Pacific". The four year project (2018-2021) is funded by the Global Environmental Facility and is implemented by UN Environmental and executed by SPREP.

Figure 7. Information requirements for the initial stages of SPREP's adaptation planning support to countries



Current Challenges

A clear justification needs to be established for all country requests for assistance from SPREP, and from development partners and climate finance funds. It was reported that a key challenge SPREP faces in adaptation planning and decision making is accessing information necessary for building a project rationale for country requests. This means that SPREP needs sufficient evidence of the identified adaptation needs and vulnerabilities, as well as stakeholder and community consultation. The narrative for the justification should ideally draw on best available science and baseline information on social, cultural, environmental and economic conditions of the area concerned. The narrative should ultimately answer the question: *is it going to achieve resilient development in the Pacific?* However, in many instances, SPREP reported that they were presented with a narrative that lacks information, or is incomplete.

At the same time, SPREP does not have a standardised procedure for countries to respond to information requests. Subsequently, the onerous task of finding missing information rests with SPREP personnel, who undertake their own research and use personal networks to find information, or use sources such as the PCCP and the INFORM portals or national communication reports from the UNFCCC website. At times, the required information is available at the country level, but is often out of date or not in the required format.

Lastly, experiences of SPREP personnel suggest that the culture of data sharing among countries in the region is still embryonic. Some countries are protective of their data and are reluctant to share it with regional organisations like SPREP. More generally accessible information types, such as policies and reports, are more

readily shared by countries. The lack of integrated information management systems, processes and capacity is also attributed to the ongoing information sharing difficulties in the Pacific.

Existing and Future Opportunities

Despite the notable challenges, SPREP is committed to investing in making information accessible, discoverable and usable. With the prevalence of information gaps found in country requests and proposals, increasingly SPREP sees its role as a broker of information for countries (see example in Box 3). Proposals being submitted to the GCF for consideration need to be robust with a detailed rationale of necessity and urgency of issues for which financial assistance is sought. As more countries begin to apply for GCF funding through SPREP, including for the formulation of NAPs, SPREP recognises the importance of information brokerage and the need to produce information products and tools that enable better climate change planning and decision making by countries. As expressed by one informant, *'SPREP's climate science and information services will play a symbiotic role with the NAP process.'*

Box 3. SPREP's Compass Guide to COP Negotiation Sessions

Aside from implementing projects that specifically focus on improving climate change information and knowledge management (i.e. Pacific iCLIM Project, IMPACT Project and INFORM Project), each year SPREP produces an information and negotiation guide called 'Compass' to help countries navigate the UNFCCC Conference of Parties meeting agenda and related events.

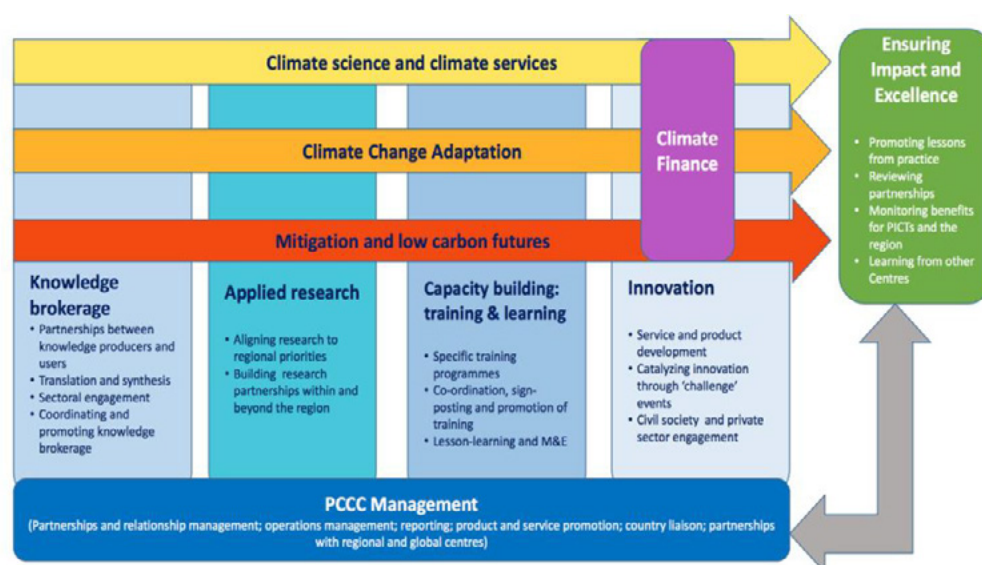
The guide contains details on the negotiation sessions (date, time, location, key negotiation topics and the Pacific's regional position on these topics) to aid the participation of country delegates. For the twenty-fourth session of the Conference of Parties in 2018, SPREP developed a pocket-sized Compass guide for Pacific Island countries with input from other CROP agencies. In 2017, SPREP also used a similar idea to develop a specific Compass guide for the UN Oceans Conference.

On reflection of lessons learned from previous SPREP managed projects and the experience of the Project Management Review Group, SPREP's internal project database, the Project Management Information System (PMIS), was created in 2017. The PMIS aims to institutionalise the collective and individual knowledge within the SPREP to prevent it from being lost when staff leave or a project comes to an end. However, the PMIS is not currently being used due to the cumbersome and time consuming process of data entry, hence the system has incomplete project information. The system is currently undergoing refinement to better serve the needs of SPREP users. There are also internal discussions of using PMIS to track and report on progress of SPREP's core programmes and projects against business and strategic plan targets.

New opportunities also exist with the new Pacific Climate Change Centre (PCCC) currently being constructed at SPREP headquarters in Apia, Samoa. The PCCC will be a regional hub for capacity building and research, focusing on four thematic areas: climate science and services, climate change adaptation, mitigation and low carbon futures, and climate finance. The PCCC will have four core functions: knowledge brokerage, applied research, training and learning, and innovation (see

Figure 8). As at July 2019, SPREP is in the process of recruiting a Centre Manager, Science to Services Adviser, and Information & Knowledge Management Adviser for the PCCC. With assistance from the Government of Japan, the construction of the PCCC is scheduled to be opened in September 2019.

Figure 8. PCCC Themes and Functions



Source: SPREP, 2019

Summary

As a regional environmental body and as an accredited entity to the GCF, SPREP is uniquely placed to lead by example and engage in evidence-based research and project development to actively source, generate, analyse and disseminate climate change data and information to assist member countries adapt to climate change. There is much anticipation for the PCCC to fulfil this purpose, however this should not sojourn SPREP's own efforts in doing the same. Improving and implementing the use of the PMIS, allocating dedicated staff and financial resources to information and knowledge management, and enhancing the scientific and technical rigour of its proposal and project assessment process are essential steps for SPREP to institutionalise the application of climate science and information to adaptation planning and decision making.

The Context

SPREP's Gender Policy, *'Gender equity and women's empowerment in communities and environments across the South Pacific'* (2016), articulates SPREP's mandate and commitments for mainstreaming gender considerations into its activities. The Gender Policy supports SPREP's Strategic Plan 2017-2022, which highlights the role that SPREP plays in achieving its vision of "a resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures".⁴⁷ The policy has three overarching goals:

- a) To strengthen and maintain an institutional environment that supports and encourages gender mainstreaming;
- b) To improve the effectiveness and sustainability of SPREP's projects and programmes; and
- c) To promote the integration of a gender perspective into the programmes and projects of member countries and cooperation partners.

To achieve these goals, the policy identifies two specific interventions: undertaking gender analysis for projects implemented and executed by SPREP, and mainstreaming gender considerations at project, programme and institutional levels. The policy encompasses people of all ages and sex regardless of their gender identity, disability status, religion, ethnicity, socioeconomic status, geographic area or migratory status. Partnerships with UN Women and national governments are identified by SPREP as being essential to turn the Gender Policy into practice.

SPREP's responsibility for gender and social inclusion rests with two focal points: the Human Resources Manager and the Environmental Planning Adviser. Following the completion of the Pacific Adaptation to Climate Change (PACC) programme (2009-2014) (see Box 4), SPREP's dedicated focus on gender considerations gradually waned. Recognising this gap, senior management decided to appoint internal focal points in order to reinstate organisational commitment on gender equality and social inclusion. The Human Resources Manager is tasked with increasing equity and inclusion into SPREP's workplace practices. The Environmental Planning Adviser focuses on policy coordination and the integration of gender and social inclusion issues into SPREP supported projects and programmes.

SPREP currently has more women employed in the organisation than men (59% female; 41% male) including in senior executive and management positions (66% female; 34% male). The percentage of women is significantly higher for locally recruited staff (79% female; 21% male) compared to international staff (44% female; 56% male). Having a majority female workforce has been an inadvertent outcome of the merit-based recruitment process used by the organisation. There have been no proactive efforts made by SPREP to recruit more women, although the aim of recruiting Pacific island women in project leadership and management roles is clearly stated in SPREP's Gender Policy. The other aspect of the policy, to ensure SPREP programmes and projects are gender-responsive, is being implemented for some projects but not consistently across all SPREP programmes and projects.

How Climate Change Information is Used

The Climate Change Resilience Programme within SPREP leads technical planning and support for member countries on adaptation and mitigation. Climate change information is predominantly used for project proposal development and review. As there are no gender or social analysis experts in SPREP, gender and social assessments, in which climate change information might be used, are not carried out internally but rather outsourced to external consultants. The gender assessment and the subsequent gender action plan developed as part of the former PACC programme are considered as best practice resources for SPREP and are being used to inform the design of new projects. Based on the lessons learned from the PACC programme, a gender action plan was prepared for the adaptation plan project in Federated States of Micronesia funded by the Adaptation

⁴⁷ SPREP Gender Policy, p.5

Fund, and a desk analysis of gender and social policies was carried out for the development of Tuvalu's national adaptation plan proposal to the Green Climate Fund.

Box 4. PACC Programme focus on gender dimensions of climate change⁴⁸

The PACC programme was the first and largest climate change adaptation initiative implemented by SPREP across 14 Pacific island countries and territories. The programme had an integrated and coordinated approach to deliver on three key areas: practical demonstrations of adaptation measures, mainstreaming climate risks into national development planning and activities, and knowledge sharing for building adaptive capacity.

In 2012, PACC commissioned an external assessment of the degree to which gender considerations were being incorporated into the programme. The gender assessment provided 16 recommendations:

1. Prioritise gender mainstreaming in all project planning and documentation, supported by the necessary technical expertise and resources
2. Significantly increase attention to social science
3. Collect sex-disaggregated data and undertake gender analysis to identify gender-differentiated benefits and impacts of the adaptation measures
4. Undertake research and develop case studies to identify the gender and culture dimensions of climate change
5. Develop a PACC Gender Action Plan (which was developed for 2013-2014 period)
6. Integrate gender into national and regional project log frames and work plans
7. Develop strategies to address gender imbalances in project structures and gender-based inequalities related to participation and decision-making at all levels
8. Strengthen partnerships with National Women's Ministries/Departments and women's organisations and regularly engage with gender focal points
9. Develop climate change knowledge and capacity (particularly technical knowledge and skills) among both women and men
10. Support capacity building in gender and climate change
11. Undertake effective communication for development in climate change to support strategic gender-aware objectives
12. Integrate gender into project monitoring and evaluation processes
13. Collect and disseminate lessons learned and good practices regarding the gender dimensions of climate change mainstreaming and adaptation
14. Disseminate resource material and information about gender and climate change
15. Explore national and regional partnerships, and strengthen collaboration and coordination to address the gender dimensions of climate change
16. Undertake advocacy for gender and climate change at all levels

⁴⁸ PACC Gender Assessment and Action Plan is available from <https://www.sprep.org/attachments/Publications/CC/PACCTechRep3.pdf>

How Gender and Social Information is Used in Climate Change Activities

SPREP's Gender Policy encourages each project supported by SPREP to develop specific gender indicators which are disaggregated by sex and measure the impact on men and women. The indicators are to be included in each project's logical framework at the start of the project, and continuously monitored throughout the project cycle. It also encourages a full gender assessment to be undertaken for evaluation of SPREP projects and programmes, when appropriate.

In reality, informants noted that developing gender indicators and carrying out gender analyses are haphazardly practiced and depend entirely on the willingness of individual programme and departmental leaders, project managers and project officers to do so. There is no consolidated data or information available to determine if and which programmes or projects have developed gender-specific indicators, if the indicators are being monitored and reported on, whether any gender assessments have been undertaken, and how the findings have informed the delivery of programmes and projects. As such, it is difficult to garner an organisation-wide perspective on how gender and social information is being used across SPREP's programmes and projects, both relating to climate change and other areas.

At the project level however, gender and social information is being utilised to report on the breakdown of participants who attend consultations, training and workshops delivered by SPREP. For environmental planning, SPREP uses quantitative (i.e. demographic data) and qualitative (i.e. focus groups and interviews) data to assist countries identify project beneficiaries and specific needs of disadvantaged and marginalised groups, and to compile baselines for social impact assessments. The data is not systematically collected or stored. For other core programmes of SPREP, using gender and social information may be a compliance or reporting requirement that countries need to fulfil in accordance with relevant international agreements on the environment and climate change.

Information Types and Sources

SPREP relies on countries to provide data, information and reports on gender markers and social conditions, which are not always readily available. Population census data, national gender equality policies and project reports are common sources obtainable in each country. SPREP personnel use published reports and resource guides on gender equality and social inclusion from United Nations Environment Programme and United Nations Women.

Current Challenges

There are several challenges that hamper SPREP's realisation of its aim and objectives articulated in the Gender Policy. It is unclear which programmes and projects have gender-responsive indicators and have completed gender analyses as there is no organisation-wide requirement for staff to monitor and report on these actions. Without proper and mandatory reporting systems in place, it is difficult to assess how well SPREP is tracking in achieving gender mainstreaming outcomes as an organisation. For now, specific intervention and reporting on gender mainstreaming occur at the project or programme level only.

The gender focal points have expressed the need for dedicated positions within the organisation to fully support the implementation of the Gender Policy. As gender focal points are non-remunerative positions that have been added onto existing workloads of the Human Resources Manager and the Environmental Planning Adviser, they have limited time to progress the work on gender mainstreaming. There are also no terms of reference and no allocated budget attached to the focal points. Informants noted a lack of technical and financial resources as a major barrier to implementing the SPREP Gender Policy. Due to these constraints, much of the time spent by gender focal points is restricted to representing SPREP at relevant regional meetings and organising logistics for external agencies wanting to deliver gender awareness and capacity building training in Samoa.

SPREP interviewees conceded that enhancing their focus on gender and social inclusion will not be straightforward. The Pacific region is hugely diverse in roles assigned to different groups within society. SPREP recognises that understanding the differences between cultures and countries is necessary for climate change adaptation planning. For instance, some communities may practice matrilineal lineage and others patrilineal, which has substantial implications for adaptation interventions. SPREP senior management agrees that

collecting and obtaining age and sex disaggregated data is an appropriate starting point for increasing the equity and inclusiveness of SPREP's interventions, and that more work is needed to make gendered data available at the national level.

Existing Good Practices and Future Opportunities

Through the PACC programme, SPREP published resource materials on gender and climate change. This includes the 'PACC Experiences' brochure on gender and climate change adaptation (2014)⁴⁹ and the Pacific Gender and Climate Change Toolkit (2015).⁵⁰ These publications are specifically designed to apply a gender lens to climate change and energy projects, with wider application for other sectors. These publications are available on the Pacific Climate Change Portal.

SPREP gender focal points informing this analysis expressed positively that there is increasing feminisation of the workforce in the Pacific and a growing cohort of professional women leading national government agencies on climate change and the environment. Internally, SPREP is applying through the Australian and New Zealand international volunteer schemes to recruit volunteers to specifically advance the implementation of Gender Policy. Two volunteer positions, a gender specialist and an environmental and social safeguards specialist, are being considered. In the long term, institutionalising gender and social considerations across the organisation will require permanent staffing and a dedicated budget, a matter deserving closer attention by SPREP executive and senior management.

Over the past two decades, there has been considerable progress in incorporating the 'gender agenda' into broader environmental and climate change discourse in the Pacific. The NAP process, established under the UNFCCC Cancun Adaptation Framework in 2010, has driven greater consideration of gender and social issues in adaptation planning as it stipulates that countries must adopt a "country-driven, gender-sensitive, participatory and transparent approach to NAPs".⁵¹ The emphasis on gender equality and social inclusion and empowerment also features prominently in funding requirements of multilateral climate finance institutions, including GEF, Adaptation Fund and GCF. As a regional entity accredited to the GCF, SPREP plays a key role in contributing and supporting climate change initiatives that have positive outcomes for gender equality and social inclusion.

Summary

The use of gender and social information within SPREP is generally confined to consideration at a project and programme level. It was recognised that integrating gender and social considerations is not only an imperative for climate change adaptation, but for all core functions and programmes of SPREP in order to fully realise its strategic vision for a resilient Pacific environment. There is mounting need for proper gender and social analysis as SPREP extends its support to countries in developing and implementing NAPs and to some extent, Nationally Determined Contributions. For this, SPREP will need to first make institutional changes to embed positive practices and procedures and allocate adequate resourcing on gender and social inclusion before it can assist other countries.

⁴⁹ Accessible here: <https://www.pacificclimatechange.net/document/pacc-experiences-no-3-gender-and-climate-change>

⁵⁰ Accessible here: <https://www.pacificclimatechange.net/document/pacific-gender-climate-change-toolkit-complete-toolkit>

⁵¹ Decision 5/CP.17, paragraph 3

PAPUA NEW GUINEA

Three case studies have been compiled for Papua New Guinea which examine how climate change information is being used for national adaptation planning, road infrastructure and gender and social inclusion.

NATIONAL ADAPTATION PLANNING

The Context

Papua New Guinea's vulnerability to climate variability and change is underpinned by its predominantly rural population and reliance on agriculture. More than 80 per cent of the population of Papua New Guinea live in rural areas⁵² and depend heavily on subsistence agriculture for food security.⁵³ Combined with pressures of population growth, climate change poses a serious risk to the safety and livelihoods of communities in Papua New Guinea. National priorities for adaptation are outlined in first and second national communications to the UNFCCC and in the Nationally Determined Contributions (NDC).

Papua New Guinea: Priority Areas for Adaptation

1. Coastal Flooding and Sea Level Rise
2. Inland Flooding
3. Food Insecurity
4. Cities and Climate Change
5. Climate Induced Migration
6. Damage to Coral Reefs
7. Malaria and Vector Borne Diseases
8. Water and Sanitation
9. Landslides

The Climate Change and Development Authority (CCDA) coordinates the Government of Papua New Guinea's response to climate change. The CCDA was established in 2010, with responsibilities transitioned from the former Office of Climate Change and Development. The broad purpose of CCDA is to '*promote and manage climate compatible development through climate change mitigation and adaptation activities*'.⁵⁴

The *Climate Change (Management) Act 2015* and the *Paris Agreement (Implementation) Act 2016* provide the legal framework for climate change activities in Papua New Guinea. The main guiding policy for CCDA is the National Climate Compatible Development Management Policy (2014).⁵⁵ This policy aligns with the Papua New Guinea Vision 2050, the Development Strategic Plan 2010-2030, the National Strategy for Responsible Sustainable Development (StaRS) and the Mid Term Development Plan (MTDP III) 2018-2022. In November 2018, CCDA launched its Corporate Plan 2018-2022. The Corporate Plan is the overarching strategic plan that provides a blueprint for implementation of Papua New Guinea's international, regional, national and subnational climate change policies and legislation.

CCDA leads the National Adaptation Plan (NAP) formulation and it has carried out preliminary groundwork to initiate the NAP process. To date, numerous vulnerability assessments at national, community, province and district levels have been conducted by CCDA. In 2017, the NAP Global Support Programme (NAP-GSP)⁵⁶ supported the Government of Papua New Guinea to undertake a stocktake of current climate change adaptation initiatives. Subsequently, a review of documentation, policies and strategies, and an assessment of climate mainstreaming and capacity building initiatives relevant to the NAP process was conducted. A baseline assessment of CCDA's institutional arrangements and project management capacity was also carried out

⁵² World Bank, World Bank Open Data: Papua New Guinea. Accessed from: <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=PG>

⁵³ Bourke, Michael et al (2009). 'Food Production, Consumption and Imports' in Michael Bourke and Tracy Harwood (eds), *Food and Agriculture in Papua New Guinea*. Australian National University: Canberra.

⁵⁴ *Climate Change Management Act 2015*

⁵⁵ Available here: <https://www.pacificclimatechange.net/document/papua-new-guinea-national-climate-compatible-development-management-policy>

⁵⁶ The NAP-GSP is a joint initiative of UNDP and UN Environment launched in June 2013. Financed by the Global Environment Facility (GEF) Least Developed Countries Fund (LDCF), and the Special Climate Change Fund (SCCF), the NAP-GSP assists developing countries integrate adaptation priorities into medium and long term national planning and financing by offering technical support and guidance on NAP processes, and facilitating knowledge exchange between countries.

through support from the Climate Ready Project, funded by USAID.⁵⁷ Informants advised that adaptation decisions of CCDA are driven by legal and policy directives, as well as community need and available funding. The main objectives of adaptation decisions are to reduce community vulnerability to the impact of climate change, increase adaptive capacity and resilience, and respond to urgent adaptation needs of communities.

In October 2017, a Readiness and Preparatory Support Proposal was prepared for submission to the Green Climate Fund (GCF) which outlined a national adaptation planning project for funding. The initial submission of the 'Advancing Papua New Guinea's National Adaptation Plan' project focused on strengthening multi-sectoral coordination to integrate climate risks in development planning and establishing a financing framework for climate adaptation. The proposal was developed with assistance from the United Nations Development Programme (UNDP) and NAP Global Support Programme. The proposal will be considered by the GCF Board in October 2019.

The current composition of CCDA's senior management team includes the Managing Director, General Managers and Divisional Managers. CCDA is answerable to the Minister for Climate Change and Environment. The Climate Change (Management) Act 2015 requires a governing Board to be established which is yet to come into fruition. CCDA has four Technical Working Groups (TWG) for adaptation, REDD+, Measurement, Reporting and Verification (MRV) and National Communication. The current decision making structure of CCDA is hierarchical however informants noted that this is likely to change as CCDA is undergoing a restructure to better serve its mandate and meet obligations of the Paris Agreement.

How Climate Change Information is Used

There are diverse examples of climate change information being used for adaptation planning and decision making in CCDA. The main purposes for which climate change information is used are for developing project proposals, project design and implementation, communication and reporting, community and stakeholder consultation, and budget and resources planning. The practice of collecting and applying climate change information is both division- and project-based.

The Measurement, Reporting and Verification (MRV) and National Communication Division of CCDA is responsible for compiling Papua New Guinea's national communications and biennial update reports to the UNFCCC.⁵⁸ National communications to the UNFCCC include a narrative on national circumstances and adaptation and mitigation efforts, as well as an inventory of greenhouse gas emissions. The process of compiling the national communications and how the information is used to inform climate change decisions is described in Box 5.

By leading the consultation, MRV and National Communication Division staff have valuable knowledge on community needs and vulnerabilities to specific hazards, which they apply to assist other divisions in CCDA. For instance, they use the knowledge to identify and suggest suitable communities and pilot sites for any new projects being considered by CCDA. As the core business of MRV and National Communication Division is data collection and reporting, it plays a vital role as the internal broker and manager of information.

CCDA established the adaptation TWG in 2015 as an advisory body for national adaptation projects and interventions. Its members include government departments, development partners, non-governmental and civil society organisations, and sub-national representatives. Information on CCDA's adaptation activities are shared through the TWG. The National Weather Service (NWS) is a member of the TWG and provides an update on climate forecasts and El Niño-Southern Oscillation (ENSO) outlooks. CCDA does not have meteorological

⁵⁷ Climate Ready is a five-year project funded by the United States Agency for International Development (USAID) being implemented in 12 Pacific island countries. The project focuses on climate change policy planning, climate finance and institutional capacity building.

⁵⁸ Parties to the UNFCCC are required to submit national communications every four years and biennial update reports (BUR) every two years. The scope of the BUR is a summary of national greenhouse gas inventories and additional information on mitigation actions, needs and support received.

analyses and forecasting capabilities, thus having NWS on the TWG on adaptation is a vital source of advice and expertise on climatology.

The Adaptation Division of CCDA uses metrological data from the NWS to broadly inform the planning and conduct of baseline assessments for adaptation projects. The Adapting to Climate Change and Sustainable Energy (ACSE) Project⁵⁹ of CCDA used rainfall data from NWS to determine a suitable site for drilling a borehole to access ground water as a source of water supply for a village in Milne Bay province. Using historical rainfall data, the ACSE Project selected a site above the water table to drill the borehole to reduce the risk of flood impact.

Box 5. National Communication: Data Collection Process and Application of Information

National communications are a reporting mechanism established under the UNFCCC (Article 12, paragraph 1). Parties to the Convention are required to prepare national communications every four years. The reports need to include a national inventory of greenhouse gas emissions by sources and removal by sinks using agreed methodologies, a general description of adaptation and mitigation actions taken and any other information that is relevant to achieving the objectives of the Convention. Papua New Guinea has so far submitted two national communications, in 2002 and 2015.

The MRV and National Communication Division collects data on the top five emissions producing sectors in the country – waste, energy, agriculture, land use and industrial processes, and forestry – to compile the greenhouse gas inventory. Initially, the MRV and National Communication Division faced difficulties in acquiring data from external agencies as there were concerns regarding how the data would be used and whether its publication would have any adverse effects on business operations. The MRV and National Communication Division decided the best approach was to explain the national communication process and why the data was needed to calculate emissions for the national greenhouse gas inventory. Ongoing meetings with agencies resulted in the development of a Memorandum of Understanding (MoU). Having a MoU in place has been beneficial as external agencies understand exactly how their data will be used. The information from the national greenhouse gas inventory is used not only for UNFCCC reporting but by national government to measure its progress in reducing emissions as outlined in the NDC. The information also feeds into broader government decisions on what mitigation approaches should be taken for key sectors, including how to transition the country from diesel to renewable energy sources.

Qualitative analysis is also undertaken by the MRV and National Communication Division to prepare national communication reports. In addition to secondary information such as reports and studies, the MRV and National Communication Division organises stakeholder and community consultations across the country to garner views and feedback on adaptation and mitigation initiatives. The consultation findings are included into the narrative of relevant sections of the national communication report. An internal stakeholder validation completes the national communication process and the final report is submitted to the UNFCCC Secretariat, which is then published on the UNFCCC website. The consultation sessions conducted by the MRV and National Communication Division for the national communication also provide an opportunity to raise community awareness on climate change and disseminate information on CCDA's activities.

Information Types and Sources

CCDA staff reported using a variety of climate and non-climate data, which is predominantly available from domestic sources. External sources of climate change information are also used as shown in Table 8.

⁵⁹ The ACSE is a regional programme funded by European Union (EU) through the EU Development Fund and managed by the German Agency for International Development, GIZ.

Table 8. Data Categories and Information Sources used by CCDA

Categories of data used		
Agricultural	Geographic (coastal and mountain)	Oceanographic
Demographic	Geomorphological (topographic and bathymetric)	Property
Economic	Health	Social (gender, education, migration, cultural)
Energy and Emissions	Hydrological	Seismic
Environmental	Infrastructure	
Financial	Meteorological	
External sources of climate change information		
Australian Bureau of Meteorology	National Institute of Water and Atmospheric Research (New Zealand)	Pacific Risk Information
Climate Analytics	Pacific Community (SPC)	SPREP
CSIRO	Pacific Climate Change Portal	UNFCCC
IPCC	Pacific Meteorological Council	University of the South Pacific (USP)

CCDA collects primary and secondary data on key sectors to compile the greenhouse gas inventory. Sources of data used for calculating emissions include:

- a) Waste: National Capital District Commission and Conservation and Environmental Protection Authority (CEPA);
- b) Energy (electricity, aviation, roads and marine): Department of Petroleum and Energy, Department of Transport, PNG Power Limited, Air Niugini, other commercial airlines and the Civil Aviation Safety Authority;
- c) Agriculture: Department of Agriculture and commercial operators;
- d) Land use and industrial processes: Department of Lands and Physical Planning, Oil Search, mining companies and extractive industries; and
- e) Forestry: PNG Forest Authority.

CCDA is currently in the process of establishing a national climate change portal as part of the Pacific iCLIM Project and will upload an assortment of legislation, policies, reports and documents including national communications and biennial update reports.

CCDA staff use data and information from other government departments and agencies. The NWS in the Department of Transport and Infrastructure collects and disseminates a wide variety of meteorological data for free to members of the public under the government's community service obligations (see Box 6). The Geohazards Division under the Department of Mining and Petroleum has data on seismic activity. Environmental and hydrological data is available from the Conservation and Environmental Protection Authority (CEPA). Demographic and other general statistical data is available from the National Statistics Office.

Current Challenges

Informants reported internal and external challenges pertaining to the collection, storage, management and dissemination of climate change information.

The MoU for the greenhouse gas inventory stipulates that data from external agencies is only to be used for calculating emissions, thus the MRV and NC Division cannot share the raw data with other internal stakeholders in CCDA. This has been an ongoing tension in the organisation as other divisions would like to see the data being shared and used more widely across the organisation to support policy and technical analysis, and other purposes beyond the greenhouse gas inventory.

Another reported challenge is obtaining disaggregated data and information at provincial, district and local levels. Statistical information is available at the national level and for Port Moresby, however it is more difficult to find published data at the subnational level for all sectors (except for the census data but this is outdated). Most divisions and projects in CCDA spend considerable time and resources in collecting and sourcing information on communities they work with. Typically, information is kept within the division or project.

CCDA does not have a central repository for storing and managing data and documents collected and produced by different divisions and projects. Information is stored on individual laptops and personal computers, and there is no practice of conducting file backup. CCDA staff interviewed for this study raised concerns about not being able to recover files if the laptops are stolen or damaged. Storing information on individual devices is not a problem unique to CCDA. Most government departments and agencies in Papua New Guinea do not have a centralised information management system, which impedes information access, discoverability, sharing and usage. The MRV and National Communications Division staff explained that there are lengthy delays associated with obtaining data from other government departments for the greenhouse gas inventory because they have to spend time looking for the data.

Box 6. National Weather Service Data and Information Products

NWS has data on rainfall, temperature, sun exposure, relative humidity, wind, evaporation, cyclonic activity and sea level (the only wave gauge in the country is located in Manus Island). Customised climate datasets for different sectors can be generated by NWS using the Climate Database for the Environment services client (CLiDEsc), a climate analysis and product generation software developed by the New Zealand National Institute for Water and Atmospheric Research (NIWA). The outputs of CLiDEsc are presented as time series, tables and maps to support sector-specific information needs. The CLiDEsc links to the web-based CLiDE data management system originally developed by the Australian Bureau of Meteorology.

The NWS produces climate briefs, weather and rainfall forecasts, and El Niño-Southern Oscillation (ENSO) outlooks which are disseminated to the public through the National Broadcasting Corporation. These information products are used by the National Disaster Centre for emergency planning and response.

The NWS does not have the modelling software necessary for modelling climate scenarios. Under the Australian Government's Pacific Climate Change Science Program (2009-2011), the Commonwealth Scientific and Industrial Research Organisation (CSIRO) generated climate projections for Papua New Guinea to the year 2030 and 2050. NWS is the custodian of these projections and disseminates them to government departments that require them. The NWS has expressed a strong need for continued technical and technological support on scenario modelling to inform national planning and decision making on climate change.

The culture of information sharing in CCDA is still evolving. Staff tend to keep information to themselves and within their divisions or projects, rather than treating information as a valuable asset for the organisation. In developing the national climate change portal, the Media and Communications Division of CCDA is collating data, policies, reports and other information products from different divisions and projects to upload onto the portal. However not all divisions and projects are open to sharing their information.

Other issues identified by CCDA senior management include the need for climate scenarios to guide assessments of adaptation and mitigation options for different regions of Papua New Guinea, evidence-based information to strengthen the rationale for climate action, and information products on climate science that can be easily understood by parliamentarians and communities.

Existing Good Practices and Future Opportunities

The importance of using climate change information for the NAP process is acknowledged by CCDA senior management. In 2017, stakeholders identified strengthening climate information systems and developing monitoring and evaluation systems to measure the effectiveness of adaptation actions and financing as priorities

for facilitating the NAP process.⁶⁰ These priorities continue to be addressed by CCDA and the recent launch of the CCDA Corporate Plan 2018-2022 demonstrates the organisation's commitment to improving information and knowledge management (see Box 7).

Box 7. CCDA Corporate Plan 2018-2022: Focus on Information and Knowledge Management

CCDA's Corporate Plan 2018-2022 sets out five strategic outcomes to support national climate change objectives. Goal five focuses on "Integrating climate change information and knowledge." Strategies and objectives under this goal are as follows:

Strategy 5.1 Establish an Information and Knowledge Management Advisory Committee to oversee, monitor and improve climate change information discoverability, accessibility and storage for Papua New Guinea

- Objective 1. Develop a strategic framework for climate change information and knowledge management
- Objective 2. Establish an Information and Knowledge Management Advisory Committee

Strategy 5.2 Design and launch a live climate change portal using a cloud server and stakeholder-supported database inventory systems

- Objective 1. Design a climate change portal guided by the information and knowledge management framework
- Objective 2. Mobilise and secure resources for the climate change portal infrastructure (cloud server, database inventory system, etc.) from government, private sector and development partners
- Objective 3. Engage stakeholders (research institutions, agencies private sector actors) to collect, store and share climate information

Strategy 5.3 Promote awareness and use of the climate change portal for CCDA and all relevant stakeholders

- Objective 1. Promote awareness and use of the climate change portal for CCDA and all relevant stakeholders

CCDA informants indicated that the national budget allocation for climate change is relatively small compared to the scale of adaptation and mitigation interventions needed to realise the goals of the NDC. Instead of competing for government resources with other departments, CCDA staff believe there is potential for climate change to be mainstreamed into core development sectors, including agriculture, education, health and infrastructure. This would be a positive move as improving climate resilience of existing government services and programmes would be more effective and sustainable than having standalone climate change projects with definitive end dates. The need for CCDA to move from a project-driven approach to a country-driven approach to climate change adaptation and mitigation is echoed by senior management. Stakeholder engagement and collaboration, and information sharing are identified as key enablers for climate change mainstreaming.

The development of CCDA Communication Strategy is a positive step forward for encouraging information exchange and promoting information as an organisational asset. The Media and Communications Division has drafted the Communication Strategy which has specific activities to educate staff about the benefits of information sharing, including 'Bung and Learn' (similar to 'show and tell') sessions. There are also activities for increasing community awareness on climate change and improving public access to climate change information. The Communication Strategy will be finalised and launched in August 2019.

⁶⁰ UNDP (2018). *National Adaptation Plan process in focus: Lessons from Papua New Guinea*. Available at: <https://www.undp.org/content/undp/en/home/librarypage/climate-and-disaster-resilience-/national-adaptation-plan-process-in-focus--lessons-from-Papua-New-Guinea.html>



Summary

Climate change information is actively used for adaptation planning and decision making by CCDA, however the practice is primarily confined to division planning and project management. Different datasets are being collected and used to prepare national communications report for the UNFCCC, baseline assessments and vulnerability assessments for individual adaptation projects. To avoid repetition in the collection of data, proper management and storage of data and information is crucial for CCDA's planning and decision making, as well as for the formulation of NAP. With relevant policies and a revised Corporate Plan already in place, the next step for CCDA is to put policy to practice by assimilating information management into organisational procedures and systems and building the knowledge management capacity of staff.

ROAD INFRASTRUCTURE

The Context

The delivery and maintenance of transport infrastructure is an ongoing challenge in Papua New Guinea. The country has approximately 746 bridges and 30,000 kilometres of sealed roads, of which 8,740 kilometres belong to the national road network and 22,000 kilometres are provincial and district roads.⁶¹ Poor road conditions prevent access to markets and to health and education services⁶², and road infrastructure delivery is hampered by physical (i.e. climate, geography and topography) and development-related (i.e. population growth, maintenance capacity and access to finance) challenges. As a risk multiplier, climate change will exacerbate these problems.

The Government of Papua New Guinea's *Medium Term Development Plan (MTDP) III 2018–2022*, commits to extensive expansion of the national road network.⁶³ The plan refers to the national road network as the 'economic backbone' of Papua New Guinea, carrying approximately 89 per cent of passenger and freight traffic nationwide.⁶⁴ The National Transport Strategy (2013) is aligned with the MTDP and outlines the Government's guiding vision for the transport sector.⁶⁵ The Strategy includes commitments on climate change adaptation, including the integration of climate risks into transport infrastructure design standards and the establishment of land- and sea-based weather stations by the National Weather Service (NWS) to advise transport agencies on rainfall intensity and duration.

National Transport Strategy Vision

"Well integrated, competitive, safe, affordable, financially and environmentally sustainable transport system that serves the economic and social goals of Papua New Guinea"

There are multiple national entities involved in roads management in Papua New Guinea, including:

- a) The Department of Transport (DoT), which is the lead national agency for transport policy, and is responsible for sector planning and for preparing sector budget submissions.
- b) The Transport Sector Coordination, Monitoring, and Implementation Committee (TSCMIC), which is chaired by DoT and facilitates coordination among 3 transport sector agencies (aviation, land and marine) and develop a whole-of sector approach to planning.
- c) The Department of Works (DoW), which is responsible for managing national land transport, including roads and bridges, and is the custodian of the National Infrastructure Design Guidelines, standards and specifications.
- d) The National Roads Authority (NRA), which is responsible for routine maintenance of 2,200 km of the national road network and is the supporting agency for the PNG Road Fund.

Most road construction and maintenance work is contracted to private sector companies. This work is overseen by DoW which maintains provincial works units with a design services function in most provinces. The Design Services Division of DoW is responsible for developing and implementing environment and social safeguard policies including Environmental Management Plans to manage and mitigate identified environment and social safeguard risks associated with road and bridge projects. The provincial governments and District Development

⁶¹ Alamgir, Mohammed et al, 'Infrastructure Expansion Challenges Sustainable Development in Papua New Guinea' (2019) 14 Public Library of Science.

⁶² Dornan, M (2016). 'The Political Economy of Road Management Reform: Papua New Guinea's National Road Fund: Road Management Reform' (2016) 3. *Asia & the Pacific Policy Studies*

⁶³ Government of Papua New Guinea. *Medium Term Development Plan III 2018–2022 Volume One Development Planning Framework and Strategic Priorities, Section 3: Infrastructure*. Port Moresby: Department of National Planning and Monitoring, 2018.

⁶⁴ Alamgir, Mohammed et al, 'Infrastructure Expansion Challenges Sustainable Development in Papua New Guinea' (2019) Public Library of Science.

⁶⁵ Government of Papua New Guinea, 2013. *National Transport Strategy*

Authority work independently on road management but collaborate on specific issues such as road safety and approving road design.

Road management, and especially maintenance, is reported to have suffered in the past decade because of underfunding, institutional fragmentation, capacity constraints, and politicised decision making.⁶⁶ Modelling and assessment commissioned by donor partners and the Government of Papua New Guinea concluded that a significant level of investment was required to ensure the viability of much of the existing road network, including proper funding of the NRA to manage and maintain road assets.⁶⁷ Consequently, climate proofing the national road network is no easy feat, and strong leadership and coordination is needed to address the underlying issues.

In relation to climate change, neither DoW or DoT are members of the inter-agency Technical Working Groups established by the CCDA. This case study is focused on road infrastructure and draws on information provided by CCDA, DoW and NWS. Due to constraints in timing and personnel availability, other relevant land transport agencies were not interviewed.

How Climate Change Information is Used

The Design Services Division does not currently perform any climate analyses and relies on external agencies and consultants to identify and assess potential climate change risks as part of the road design process. It has a working relationship with the National Disaster Centre (NDC) and seeks NDC's expert advice on which hazards (e.g. flooding) may affect a certain area to determine the suitable design and location of roads. It recognises the benefit of having access to climate change projections to inform civil design works however technical support is needed to build the knowledge of DoW engineers to use and apply projections for devising road designs that are climate-resilient. DoW broadly treats climate change impacts as 'hazards' that need to be managed and mitigated as part of road design and construction. There is concern that landslides, flooding and sea level rise will adversely affect the overall condition and life of road assets.

Historical rainfall data from the National Weather Service (NWS) was used by DoW for its recent revision of the Flood Estimation Manual. The Manual provides standard guidelines for estimating rainfall runoff and floods in Papua New Guinea. It is intended to be used for planning and design of bridges, culverts, drainage works and other small and medium sized engineering works. Incorporating rainfall data and other available information on future climate into the guidelines will support improvements in the accuracy of flood estimation. DoW engineers have been trained on how to use the Manual and apply the relevant flood estimation procedures.

Information Types and Sources

Climate and non-climate data, and external sources of climate change information used by DoW staff is presented in

Table 9. At the inception of project planning, the DoW conducts a baseline assessment. The scope of the assessment depends on the type of project, but typically environment, socio-economic, geotechnical and hydrological assessments are undertaken. DoW sources demographic data from the 2011 Census held by the National Statistics Office although it acknowledges that it is out of date. The baseline assessment is used to appraise environmental and social risks of government-funded civil engineering projects. The Design Services Division of DoW is responsible for developing and implementing Environmental Management Plans to manage and mitigate project risks.

Rainfall data used for DoW's flood estimation model and roads design is sourced from the NWS and the Conservation and Environmental Protection Agency (CEPA). The rainfall data from CEPA is fee-based and is only available for limited locations. The data is also not complete due to the use of obsolete equipment.

⁶⁶ Dornan, Matthew, 'The Political Economy of Road Management Reform: Papua New Guinea's National Road Fund: Road Management Reform' (2016) 3 *Asia & the Pacific Policy Studies*

⁶⁷ Office of Development Effectiveness, Road Management in Papua New Guinea: An Evaluation of a Decade of Australian Support 2007–2017, Department of Foreign Affairs and Trade, Canberra, 2018.

Table 9. Data Categories and Information Sources used by DoW

Categories of Data Used		
Demographic	Geographic (coastal and mountain)	Infrastructure
Economic	Geomorphological (topographic and bathymetric)	Meteorological
Energy and Emissions	Geophysical (seismic)	Social (education, migration, cultural)
Environmental	Health	
Financial	Hydrological	
Climate Change Information External Sources Used		
Australian Bureau of Meteorology	Geoscience Australia	Pacific Risk Information System

Occasionally, the Minister for Works requests information on infrastructure assets to inform budget planning and funding decisions. DoW staff find this information from internal project records and documents. There is a central road asset management system on roads however this is currently out of date (see next section on “Current Challenges” for further discussion on this issue).

Current Challenges

There are prevailing gaps and challenges associated with DoW’s record keeping and information management practices. It was noted by interviewees that these issues will need to be addressed before other types of information (i.e. climate change) can be effectively collected, stored, maintained, applied and shared by DoW in the future.

The DoW has a roads asset management system which is a central database for recording details and conditions of publicly funded roads in Papua New Guinea. The system is intended to be used as a decision support tool for decision makers in DoW to identify roads that are due for rehabilitation and replacement, but is not being optimally used by DoW staff. The system has not been updated for many years, and as such the system is not relied upon. One of the reasons being attributed to the system’s obsolescence is the time and cost of entering all the data into the system. Recruiting staff specifically for data entry was prevented by the limited budget of DoW. However, interviewees suggested that this could be overcome by promoting the roads asset management system as a valuable information asset to DoW and by requiring all staff to update the system with new information regularly. The road asset management system including bridges but needs to be updated.

Lack of information sharing culture in national government departments and agencies was identified as a challenge to informed decision making. DoW staff expressed concerns about data and information not being freely shared between government departments and the increasing cost of purchasing data from other government agencies. For example, DoW recently acquired custodianship of a flood estimation manual from CEPA, however the ownership of the rainfall data needed to update the manual remains with CEPA, which charges for data access. DoW would like to develop a Memorandum of Understanding with CEPA to enable free provision and sharing of rainfall and other datasets needed for infrastructure planning.

Existing Good Practices and Future Opportunities

DoW is the custodian of the National Infrastructure Design Guidelines and thus has considerable influence in how roads and infrastructure planning and design can become more climate resilient. Informants identified an opportunity to bolster information use in the project feasibility assessment stage. For example, feasibility studies commissioned prior to the commencement of any civil design should consider potential vulnerabilities to climate change and the cost of adapting or retrofitting infrastructure to withstand current and future climatic and environmental conditions. Using and applying climate change projections and other related information into roads and other civil infrastructure works is an opportunity for DoW to entrench into its mode of operation and improve risk-informed planning processes.

The Australian Government through the Papua New Guinea-Australia Transport Sector Support Program (TSSP) has provided technical support to road management branch and safety awareness in Papua New Guinea. TSSP commenced in 2007 as a 15 to 20 year commitment to achieve a well-maintained transport infrastructure network. The current TSSP Phase 2 (2015-2020) is valued at up to \$400 million. Both DoW and DoT are supported through the TSSP. The 2018 assessment of the TSSP program recommended further consideration of climate change, including devising a survey program and maintenance strategy that better addresses this problem in the context of policies to strengthen resilience to climate change, primarily as it related to increased flooding and the risk to culverts and bridges.⁶⁸ There are opportunities to systematically integrate climate change risks into transport infrastructure planning via the TSSP.

The DoW Design Services Division expressed the need for a comprehensive analysis of which infrastructure assets in the country are susceptible to climate change impacts. An output of this analysis could result in the development of Climate Resilient Design Guidelines to complement DoW's Flood Estimation Manual and Infrastructure Design standards and specifications. There may be scope within the BRCC Project to incorporate this assessment, however this will need to be discussed with CCDA and ADB.

Summary

The use of climate change information by DoW is currently limited, however there is a growing interest in accessing and using such information to improve design and management of roads and other civil infrastructure. Road construction and maintenance involves many agencies and jurisdictions, including national and provincial governments. There are activities underway to embed climate resilience into road infrastructure planning, however significant challenges remain, including poor availability of data and information management practices. With climate resilient infrastructure featuring in various national development strategies, it is pivotal that climate risks are not only addressed through asset-specific (i.e. roads, bridges, ports) projects but are incorporated more broadly into infrastructure planning for all development sectors.

⁶⁸ Office of Development Effectiveness, Road Management in Papua New Guinea: An Evaluation of a Decade of Australian Support 2007–2017, Department of Foreign Affairs and Trade, Canberra, 2018.

The Context

Papua New Guinea is the largest island country - both in land and population – in the Pacific region. It has over seven million people living in diverse terrains that include mountains, intact rainforests, coastal wetlands and coral atolls. Over 800 languages are spoken by people in Papua New Guinea, making it one of the most ethnically and linguistically diverse countries in the world. Less than five per cent of the population lives in the capital, Port Moresby.

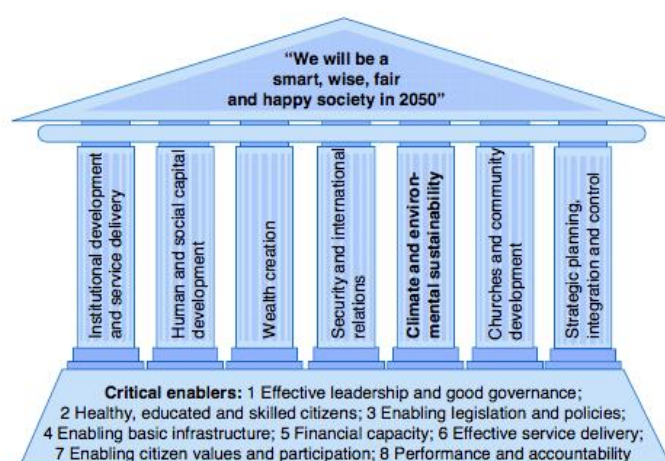
Poverty, gender equality and social development are major development challenges affecting the country. Papua New Guinea ranks 153rd out of 189 countries on the 2018 Human Development Index. Only 19 per cent of the population have access to proper sanitation facilities and 37% to clean water sources. Of the rural population, only 15 per cent have access to electricity.⁶⁹ Papua New Guinea is ranked highest for gender inequality in the Pacific region, and 159th out of 189 countries overall. There is high prevalence of violence against women and girls.⁷⁰ Currently, Papua New Guinea has no women in parliament.

National Women and Gender Equality Policy Priorities

1. Women's equality and representation
2. Women's economic empowerment
3. Gender based violence and vulnerability

The Government's Vision 2050 identifies '*human capital development, gender, youth and people empowerment*' as one of seven pillars of the strategy (see Figure 9). This pillar recognises the need for improved access to basic infrastructure and essential education and health services, and enhanced human development outcomes. The Development Strategic Plan (DSP) 2010-2030, reinforces the importance of attaining human capital development. The key social policy instruments aligned to Vision 2050 and the DSP that relate to gender equality and social inclusion are the National Women and Gender Equality Policy (2011-2015; currently being reviewed), the Gender Equity and Social Inclusion (GESI) Policy, the National Disability Policy (2015-2025) and the Social Protection Policy (2015-2020).

Figure 9. Key Pillars and Critical Enablers of Vision 2050



Source: Papua New Guinea Vision 2050

The Office of the Development of Women (ODW) in the Department of Community Development and Religion (DCDR) has the government mandate for gender. Disability and community development also fall under the responsibility of DCDR. The ODW was separated from the Gender Affairs and Development Branch and established as its own entity in 2005. The move aimed to more effectively influence decision making in

⁶⁹ Sourced from United Nations Development Programme (2018) *Human Development Report*. Available at <http://hdr.undp.org/en/countries/profiles/PNG>

⁷⁰ UN Women (2015). Violence Against Women Fact Sheet. Available at: <https://unwomen.org.au/wp-content/uploads/2015/11/VAW-Factsheet.pdf>

government and to lead policy analysis and implementation.⁷¹ The Department of Personnel Management (DPM) is responsible for increasing gender equity and social inclusion in public service. The GESI Policy recommends for each department to have a focal point to advocate for equitable and inclusive work practices. Currently 25 out of 128 government departments and agencies have GESI focal points. The CCDA does not have a GESI focal point though it has a draft gender equity and social inclusion policy, prepared by its Human Resources Division.

How Climate Change Information is Used

CCDA has four Technical Working Groups: for adaptation, REDD+, Measurement, Reporting and Verification, and National Communication. The Technical Working Groups are used as a mechanism to share information on climate change generally and on CCDA's activities. The Technical Working Groups do not presently have representatives from DPM, DCDR or civil society organisations working on women, youth or disability issues.

As the focus of DPM's work on gender equity and inclusion focuses on workplace equity and diversity, it does not require or use information on climate change. The DCDR, through the Social Protection Policy, recognises climate change as one of many contributing factors to the challenges of social protection in Papua New Guinea. The policy specifically references the effects of climate change on food security and people's livelihoods as important considerations for social protection.

How Gender and Social Information is Used within Climate Change Activities

CCDA, as the agency responsible for national policy coordination on climate change, uses gender and social information for specific purposes and projects. The information is typically used for reporting on social demography and for compiling baseline assessments for projects, as discussed below.

The Measurement, Reporting and Verification (MRV) Division of CCDA leads the task of preparing national communications for the UNFCCC. The national communications report on the progress made by Parties to the UNFCCC in advancing its goals on adaptation and mitigation. In the 'national circumstances' section of the communication, CCDA uses demographic data and qualitative information on gender norms, social customs and traditional governance to describe the societal situation of Papua New Guinea. The information is sourced from the 2011 National Census (for demographic data) and available studies and reports. The MRV Division is also involved in conducting stakeholder and community consultation for CCDA. To encourage gender representation at consultations, CCDA specifically requests in the invitation letter for both men and women to attend.

The Adapting to Climate Change and Sustainable Energy (ACSE) Project, implemented through the CCDA, collects and uses gender and social information to compile baseline profile of communities. The profiles are used to evaluate pre- and post- impacts of project interventions.⁷² In Papua New Guinea, ACSE is piloting the installation of community-managed solar photovoltaic panels and water supply systems in three villages. The baseline assessment was conducted at the beginning of the project using GIZ's Knowledge, Attitude and Practice survey to understand current socio-economic conditions of each village. The type of data collected through the survey included time-based division of labour, such as how much time was spent by men and women in fetching water, and how they used the water they collected. The baseline profiles have been used by engineers to design tailored solar and water systems for villages, that take into account the differences in gender roles and demands for energy and water. The Adaptation Division of CCDA also uses population data from the national census to compile baselines of communities, however it does not undertake any gender analysis.

⁷¹ For further details on the history of ODW, refer to SPC (2012). *Stocktake of the Gender Mainstreaming Capacity of Pacific Island Governments: Papua New Guinea*. Available at <https://pacificwomen.org/wp-content/uploads/2017/09/PNG-gender-stocktake.pdf>

⁷² The ACSE is a regional programme funded by European Union (EU) through the EU Development Fund and managed by the German Agency for International Development, GIZ.

Information Types and Sources

Demographic data from the 2011 census is reported to be commonly used by CCDA divisions for reporting on general population or for compiling socio-economic baselines. The census data is available from the National Statistics Office.

For qualitative information on gender and social issues, CCDA uses primary and secondary information sources. Primary sources include actual data collection by CCDA divisions and projects through community surveys, focus groups, interviews and consultations. The information gathered in the field is used only by divisions and projects for which it was collected, and not made available to other users in CCDA. Secondary sources of gender and social information include policies, reports and printed resources available online.

Current Challenges

CCDA staff have indicated that census data is out of date and not always accurate due to the use of random sampling methods, rather than complete coverage of all households. Past experiences indicate that informants have found people have been undercounted in villages as the census enumerators did not survey every household. In that instance, CCDA staff re-counted the resident population in order to compile an accurate baseline for their project. PNG's geography and limited transport infrastructure in rural areas makes a complete census near impossible.

Challenges observed as part of this study are associated with a lack of collaboration and engagement between CCDA and DCDR. There appears to be no interaction between these two national agencies, which is discernible through the absence of DCDR and other non-governmental gender and social representation on TWGs of CCDA. Moreover, CCDA does not have a gender focal point and CCDA staff do not have the technical capacity to undertake gender and social analyses. At the same time, DCDR does not appear to have a strong policy interest on climate change. Both the National Gender and Women's Empowerment Policy and the National Policy on Disability are silent on climate change even though it is an issue which exacerbates social vulnerabilities.

Existing Good Practices and Future Opportunities

The use of gender and social information is a relatively new and evolving area for CCDA. One project that incorporates gender and social outcomes in adaptation planning is the Building Resilience to Climate Change (BRCC) project being implemented through CCDA. With a US\$24 million grant from the Asian Development Bank's (ADB) Strategic Climate Fund and US\$3 million in additional financing from the Australian Government, the BRCC project (2016-2022) aims to incorporate climate resilience into Papua New Guinea's development investments and support climate compatible development. To achieve this aim, the BRCC project has a wide focus on climate change adaptation, including:

- a) Developing and disseminating knowledge products and adaptation tools;
- b) Improving understanding of climate change vulnerabilities and adaptation choices;
- c) Increasing sectoral, national, district and community level adaptation capacity; and
- d) Making climate resilient infrastructure a prerequisite for social development, food security and poverty alleviation.

A gender action plan has been developed for the project which stipulates gender mainstreaming and collection of age and sex disaggregated data (see Box 8). The BRCC project presents an opportunity to introduce systematic collection, analysis and reporting of gender and social data as part of a standardised process for all CCDA projects. There is opportunity for CCDA to take advantage of technical support and capacity building from the BRCC project to increase internal capability in gender and social analyses.

There is also opportunity to mainstream gender and social issues into CCDA's existing mechanisms, such as the TWGs by expanding their membership to ODW, DCDR and non-governmental organisations that have a focus on vulnerable and marginalised groups and communities. This action will support CCDA to ensure appropriate representation of key gender and social agencies in national climate change planning and governance processes. The TWGs also serve as an entry point for sensitising gender and social issues into CCDA.

The Gender Action Plan for the BRCC Project identifies gender-specific activities and targets for overall project implementation and for specific project outputs. The targets will be used for monitoring and reporting on the project progress in meeting gender empowerment outcomes. A selected sample is shown below. Two gender and social specialists are recruited by the project to support the Project Management Unit and CCDA in achieving the Gender Action Plan.

Overall Project Implementation

Performance targets:

- During design, implementation, and monitoring all community consultations will have a target of 40% female participation, and provision also made for separate men's and women's meetings.
- Deliver at least one training workshop on gender equality and HIV/AIDS to staff in each of the five provinces and one for each pilot community.
- Establish a gender balance in recruitment of project staff, and ensure the Project Management Unit has adequate gender expertise to assist CCDA in implementing and monitoring the Gender Action Plan.

Project Output 1: Climate change vulnerability assessment and adaptation plans developed and implemented by target communities

Performance targets:

- Vulnerability assessments and household surveys to collect sex-disaggregated data will include gender analysis to identify differentiated impacts of climate change on men and women.
- 20% of adaptation funding for subprojects to be earmarked for use for women's or girls' chosen activities (to be decided by women and girls themselves).

Project Output 2: Sustainable fishery eco-systems and food security investments piloted in nine vulnerable island and atoll communities

Performance targets:

- Household surveys and community vulnerability surveys have specific questions on food security and access to resources for men and women, in order to inform interventions.
- Food production, processing, preservation, and storage training courses have approximately 50:50 male/female participation.

Project Output 3: Enabling framework for climate resilient infrastructure established and communications network extended

Performance targets:

- Climate change risk management, building codes, and design standards for PNG Ports and Provincial/District Governments, demonstrate that needs of women and children are provided for.
- Climate change training materials for engineers, architects, developers and planners, include the specific needs of women and men.

Summary

Gender and social dimensions of climate change, particularly in terms of equity and empowerment is a matter of interest to national government and donors in Papua New Guinea. With CCDA expected to commence the process of developing a national adaptation plan in the near future, it is imperative that CCDA's gamut of knowledge and tools include thorough assessment on gender and social issues. CCDA can build on the gender integration efforts of existing projects rather than start from scratch. Proactively seeking opportunities to establish a working relationship with the DCDR and other government and non-government agencies on gender and social affairs will benefit CCDA in ensuring climate change outcomes and decisions are equitable, fair and inclusive for all.

⁷³ Further details available from the BRCC Project Gender Action Plan available at: <https://www.adb.org/sites/default/files/project-document/175226/46495-002-gap.pdf>

TONGA

Two case studies have been compiled for Tonga which examine how climate change information is being used for national adaptation planning and gender and social inclusion.

NATIONAL ADAPTATION PLANNING

The Context

Tonga is at the advanced stages of national adaptation planning. The revised Joint National Action Plan on Climate Change Adaptation and Disaster Risk Management 2018-2028 (referred to as the JNAP2) serves as the whole-of-country adaptation plan for the Kingdom of Tonga. The JNAP2 is consistent with the overarching Tonga Strategic Development Framework, which articulates Tonga's vision for sustainable development. It serves as an action plan for the National Climate Change Policy (2016), which establishes the mission to develop a resilient Tonga by 2035.

National Climate Change Policy Mission Statement

"To develop a resilient Tonga through an inclusive, participatory approach that is based on good governance; builds knowledgeable, proactive communities; and supports a strong, sustainable development pathway."

The JNAP2 prioritised the six objectives of the National Climate Change Policy in accordance with JNAP1 lessons learned, consultation findings from the development of JNAP2 and the vulnerability assessments conducted by the JNAP Taskforce for the Third National Communication in 2017. The six objectives of the JNAP are:

1. Mainstreaming for a resilient Tonga;
2. Research, monitoring and management of data and information;
3. Resilience-building response capacity;
4. Resilience-building actions;
5. Finance; and
6. Regional and international cooperation.

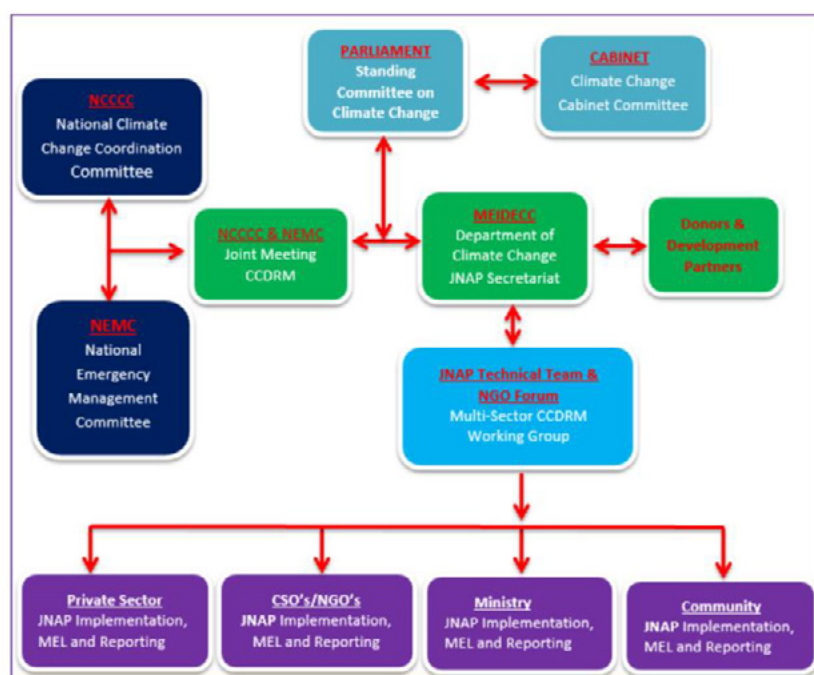
Out of 92 activities identified in the JNAP2, 23 have been allocated funding from internal government and external sources. The indicative cost of implementing all the activities identified in JNAP2 has been conservatively estimated at US \$147 million. A more detailed costing will be developed in conjunction with a full project proposal for each activity. The JNAP2 is also backed by a comprehensive results framework to guide its implementation.

As the national agency for climate change, the Department of Climate Change (DCC) under the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC) leads the JNAP2 implementation and is the Secretariat for the JNAP Taskforce (refer to Figure 10). As a multi-sectoral and multi-agency mechanism for climate change and disaster planning, the JNAP Taskforce is critical to adaptation decision making.

The decisions of the JNAP Taskforce are tabled to the joint meeting of the National Climate Change Coordinating Committee and the National Emergency Management Committee, which consists of Chief Executive Officers (CEOs) from all ministries. The Climate Change Cabinet Committee and the Parliamentary Standing Committee on the Environment and Climate Change are the high-level decision making bodies on climate change in Tonga.

Informants noted that the decision making structure of MEIDECC is largely collaborative. Collaboration occurs vertically (between staff at national, district and local levels) and horizontally (with other departments and non-governmental organisations). Decisions can be both reactive and strategic, depending on the issue at hand. Community concerns are communicated to the MEIDECC headquarters by staff stationed in outer island offices, and a conscious effort is made to place the community at the centre of government decision making.

Figure 10. JNAP Management Structure



Source: Government of Tonga JNAP2

How Climate Change Information is Used

Climate change information is used by DCC for a diverse range of purposes, including policy formulation, resilience project planning and implementation (which includes climate change adaptation), and communication and reporting.

Historical climate data on air and sea temperature, rainfall and sea level rise, and socio-economic and demographic data are used to determine and report on the current situation and climate change vulnerabilities in Tonga's national communication reports and the JNAPs (phases 1 and 2). Together with the vulnerability assessments, quantitative data on climate, geography, environment, population and economy, and qualitative information such as traditional knowledge and local experiences are used by DCC to identify specific adaptation needs of communities, and to inform priorities for adaptation projects and funding.

Tonga has used climate change data in preparation of its national communication reports to the UNFCCC. For the Second National Communication, the SimCLIM modelling tool was used.⁷⁴ SimCLIM uses meteorological (e.g. rainfall) and oceanographic (e.g. sea level) data to spatially map the biophysical impacts and socio-economic effects of climate variability and change. The SimCLIM tool was made accessible to all government departments to support sector-wide climate change planning and decision making. The agriculture sector used the tool to map the impacts of flood and heat on crop damage, to identify areas most at risk and to assess potential damage using spatial analysis. The health sector used the tool to map the correlation between rainfall, temperature and dengue outbreak.

The Tonga Meteorological Service is the custodian of national climate, meteorological and seismic data. Through the Climate and Oceans Support Program in the Pacific (COSPPac)⁷⁵ and the Finnish-Pacific (FINPAC)⁷⁶ projects,

⁷⁴ More information on SimCLIM is available at <https://www.nccarf.edu.au/content/simclim-scenario-generation>

⁷⁵ COSPPac (2013-2016) is an Australian Government funded program that worked with 14 Pacific Islands to analyse and interpret climate, oceans and tidal data to produce information products and services for communities. Implemented by the Australian Bureau of Meteorology, the program built on the success of the former Pacific Islands Climate Prediction Project (2003-2012).

⁷⁶ FINPAC (2014-2016) is a regional project funded by the Government of Finland and coordinated by SPREP, which focused on enhancing the capacity of national meteorological services in the Pacific to provide improved climate and weather

Tonga Meteorological Service generated climate projections using statistical and global dynamic models. To meet the planning needs of key sectors, the projections were generated for a 30 year time period. The shorter projection period is being used to plan for public health services and disaster risk reduction, whilst the longer projection period is being used for infrastructure planning. Seismic data is also being used by relevant government agencies to review the national building codes.

Climate change information, particularly meteorological data is considered critical by MEIDECC staff for project planning and decision making for all sectors in Tonga to achieve resilience at all levels. Addressing, adapting and mitigating the impacts associated with projected climate scenarios drives thinking and discussions among key stakeholders, which in turn influences climate change decisions of the JNAP Taskforce, MEIDECC and other decision making bodies. The decisions are translated into action plans and strategies to bring about practical and measurable outcomes towards achieving the National Climate Change Policy and JNAP2 mission of a resilient Tonga by 2035.

Information Types and Sources

DCC staff use diverse categories and sources of data and information as shown in Table 10. Data is predominantly sourced from internal government sources such as the Tonga Meteorological Service and the Statistics Department. DCC staff also use technical reports, UN decisions and other available documents relevant to the Pacific region and to Tonga from sources identified in Table 7. Climate forecasts and projections for Tonga are produced and maintained by the Tonga Meteorological Service.

Table 10. Data Categories and Information Sources used by DCC

Categories of Data Used		
Agricultural	Financial	Infrastructure
Demographic	Geographic (coastal and mountain)	Meteorological
Economic	Geomorphological (topographic and bathymetric)	Oceanographic
Energy and Emissions	Health	Property
Environmental	Hydrological	Seismic
Climate Change Information External Sources Used		
Australian Bureau of Meteorology	Pacific Community	SPREP
Climate Analytics	Pacific Climate Change Portal	UNFCCC
IPCC	Pacific Meteorological Council	
National Institute of Water and Atmospheric Research (New Zealand)	Pacific Risk Information System	

In compiling the Third National Communication, DCC engaged consultants to collect up to date data, where existing datasets, project reports or technical assessments were more than a decade old. This allowed a baseline to be established that better reflected current circumstances. Given the priority placed on climate change and disaster risk management by the Government of Tonga, data collection was considered as a worthwhile investment for the compilation of the Third National Communication.

In 2011, high resolution topographic and bathymetric data for selected areas in the islands of Tongatapu and Ha'apai was attained through Light Detection Ranging (LiDAR) surveys (see Box 9). The LiDAR survey is a highly accurate method of measuring elevation using optical remote sensing technology. The LiDAR data produced detailed maps and digital elevation models.⁷⁷ High resolution elevation data of this kind was not available prior to the LiDAR survey and is a valuable asset to Tonga. In the JNAP2 carrying out LiDAR survey for the rest of the

services to communities. The project was implemented in collaboration with the International Federation of Red Cross and Red Crescent Societies, University of South Pacific and National Meteorological Services.

⁷⁷ More information is available from the Australian Bureau of Meteorology LiDAR Fact Sheet for Tonga. Available at <https://www.pacificclimatechange.net/document/paccsap-tonga-lidar-factsheet>

Tonga is identified as a specific activity under Objective 2 (research, monitoring and management of data and information).

Box 9. Application of bathymetry and topography data from LiDAR survey

With financial support from the Australian Government, a LiDAR survey was conducted for the northern coast of Tongatapu and Lifuka and Foa Islands in the Ha'apai group in 2011. The data obtained was used for multiple applications. The Tonga Meteorological Service used the LiDAR data to carry out simple coastal inundation modelling to generate forecasts to notify communities at risk of coastal inundation and to verify the initial vulnerability assessment conducted for the coastal areas. The Tonga Power Company used the data for siting of power poles, the Tonga Water Board used the data for planning and installation of water pipes, and the aerial images were used to assess and monitor vegetation coverage to inform Tonga's forest conservation activities as part of REDD+.

Current Challenges

The DCC has experienced numerous challenges with climate change information and data. Prior to the first JNAP process, civil society organisations in Tonga were reluctant to share information with government and visa-versa due to lack of openness and collaboration. It was unclear what type of information was collected, used and stored by civil society organisations, which led to duplication and inefficient use of resources. Through the JNAP processes, a better relationship has been built between national government and non-government stakeholders, which has contributed to greater exchange of information.

There has also been challenges with cyber security and copyright infringement. Tonga's national climate change portal, developed with technical assistance from the Pacific iCLIM Project, was hacked from within the country. Whilst the security breach was rectified promptly, it raised questions about the protection of digital information over the worldwide web. Similarly, the DCC has experienced unauthorised uses of their information and reports, which is difficult to monitor and detect if they are published online. The protection, security and copyright of digital information are issues that need to be addressed through appropriate legislation, policy and administrative procedures of the Government of Tonga.

The challenge of obtaining credible climate change information and data for adaptation and mitigation planning was identified through the lessons learned process of JNAP1. As mentioned earlier, Tonga addressed this issue when compiling the Third National Communication to the UNFCCC by commissioning new data collection where existing data or reports were more than a decade old. Continuous investment in reliable and up to date data has been recognised in JNAP2 as being a critical element of climate change decision making.

One common setback identified by all key informants in this study is language. Whilst English is widely used for business of government, most of the population speak the local vernacular. In most cases, climate change information products are written in English, which must be verbally translated into Tongan by government officers working with communities or those who are stationed in outer island offices. One agency that has embraced the practice of translating important information materials into the local vernacular is the Tonga Meteorological Service. The Climate Outlooks and the Tropical Cyclone Outlooks produced by Tonga Meteorological Service are translated into Tongan. In Ha'apai, locally stationed MEIDECC staff have begun hosting community forums to explain the outlooks to people in the community and to the district emergency committees. The audience of other climate information in English is largely limited to government.

Existing Good Practices and Future Opportunities

The JNAP1 process has evolved to encourage collaboration and engagement of all stakeholders, including civil society organisations, communities, private sector, and national, subnational and local government agencies. There is now a mutual understanding and practice of information sharing between the Tongan Government and these external stakeholders. Much of the information sharing occurs offline through dissemination of weather bulletins, climate outlooks, technical and project reports, and community needs assessments at JNAP Taskforce

meetings and other government-organised forums. The Tonga Meteorological Service proactively distributes weather bulletins and climate outlooks to government provincial and town officers to ensure delivery to local communities. Building on this positive step, the JNAP Taskforce and JNAP2 implementation can further promote information sharing and greater application of climate change information to guide adaptation decisions at the national, subnational and local levels.

In addition to top-down adaptation planning processes, informants reported a growing need and demand for bottom-up community adaptation actions in Tonga. In response to the community needs identified in implementing JNAP1, the Tonga Climate Change Fund was established in 2011 to provide small-scale funding for community adaptation projects. The Fund had an initial capital of US \$5 million through support from the Asian Development Bank's Climate Change Resilient Sector Project. According to the latest records, the Tonga Climate Change Fund has distributed US\$4 million to 33 community projects since 2017. Communities would benefit from having enhanced access to climate change data and information. This should be accompanied by capacity building and training on data interpretation, analysis and application to support better informed planning, design and delivery of local climate change and community development projects.

There is some evidence of positive steps being taken to enhance local capacity building. According to informants interviewed for this study, MEIDECC encourages equitable allocation and sharing of training opportunities. If there is an invitation for an overseas conference or workshop on climate change, it will often be shared with other stakeholders external to government. The DCC will nominate people who are most likely to benefit and where capacity building is required, which has previously included people from the outer island communities. Lateral thinking and providing training opportunities to community members ensures that adaptation planning and decision making are not government-centric. There is potential for training on data collection, analysis and application to be delivered to key stakeholders in the community to build their capacity in this area.

There are also promising signs as the importance of enhancing data and information management is embedded in the language of JNAP2. The related priorities identified include increasing the application of and capacity building in data analysis, gender analysis, vulnerability assessment, cost benefit analysis and spatial analysis to support better planning and decision making on climate change adaptation and mitigation, and disaster risk management. As the JNAP2 implementation unfolds, activities will focus on addressing these priorities.

Finally, the DCC has developed a mantra of *'everything I know, people beside me know'* among staff, which promotes the culture of information sharing and knowledge transfer. This ethos has transpired into simple and novel practices within government and Tonga's diplomatic missions abroad, including to address the challenges associated with tracking climate change negotiation outcomes and linking local climate concerns to the international fora (see Box 10).

Box 10. Novel Approach to Sharing Information on Climate Finance and Negotiation Outcomes

Keeping abreast of the status on different climate finance and funding modalities is no easy task. New agreements and negotiations are constantly changing the global architecture of climate finance. Pacific Island nations who are Parties to the UNFCCC need to track the latest decisions to understand what implications they have on their access to bilateral and multilateral funding. In Tonga, the DCC has come up with a novel way of achieving this aim.

To prepare for Conference of Parties in 2013, one DCC staff opened a file sharing account in Dropbox to save previous Conference of Parties and UN decisions and relevant reports. The account was shared with the members of the Tongan delegation and Tongan diplomatic missions in London, New York and Tokyo, which allowed them to save new decisions and reports in the Dropbox and read them ahead of time to prepare their messaging and negotiation positions. The documents shared in Dropbox have now reached over 11,000 items, which are backed up on an external hard drive.

What began as a simple method of storing and sharing information has become routine practice within the DCC. All Conference of Parties and related UN decisions are saved in the Dropbox account which helps the DCC and diplomatic missions to keep track of what is going on at the international stage. Not only does it better prepare Tongan representatives to advocate for the needs and priorities of Tonga but it also connects and aligns the work of the diplomatic missions with climate change issues that are of utmost concern to communities on the ground.

The DCC recognises that Tonga is not alone and that other Pacific nations face similar challenges in staying on top of key international climate change decisions. It suggests that CROP agencies need to deploy desk officers to the UN to channel information to countries in a timely manner.

Summary

There are positive examples of climate change information being used to inform climate change planning and decision making in Tonga. The use of climate change information is not confined to DCC or MEIDECC. The application is wide ranging, with meteorological and scientific data being utilised to inform agricultural, health, infrastructure, disaster and emergency response, and utility sectors. The emergence of information solutions that are appropriate and relevant for the context of Tonga, coupled with investments in data acquisition and management should continue to enable better informed adaptation decisions at all levels.

The Context

The importance of more inclusive, sustainable, empowering and equitable human development is stipulated in Tonga's National Strategic Development Framework 2015-2025. Social institutions are one of the institutional pillars of the Framework.

The mandate for advancing the Tongan government's gender and social inclusion priorities rests with the Ministry of Internal Affairs (MIA). The MIA is responsible for local government planning and community development, and it has 23 district officers and 155 town officers deployed across the country who play a vital role as a communication channel between communities and the national government. The MIA is the chair of the Safety and Protection Cluster of Tonga's national humanitarian cluster system (see Box 11).

National Women's Empowerment and Gender Equality Tonga Policy Vision

"Gender equity by 2025. All women, men, girls and boys as a whole achieve equal access to economic, social, political and religious opportunities and benefits."

The Women's Affairs Department within the MIA is tasked with implementing the National Women's Empowerment and Gender Equality Tonga (WEGET) Policy 2019-2025. The WEGET Policy underwent a review and its revised version was launched in May 2019. The policy is accompanied by the Gender Mainstreaming Handbook and a statistical monograph called *Gender Equality: Where do we stand?*⁷⁸ The policy has five priority outcomes:

1. Enabling environment for mainstreaming gender across government policies, programmes, services, corporate budgeting and monitoring and evaluation;
2. Families and communities prosper from gender equality;
3. Equitable access to economic assets and employment;
4. Increased women's leadership and equitable political representation; and
5. Create equal conditions to respond to natural disasters, environmental challenges and climate change.

The Women's Empowerment and Gender Equality Policy recognises people with disabilities and vulnerable groups are important to all priority outcomes. Under priority outcome 5 of the Policy, key actions are identified to increase awareness and understanding of gender impacts of climate change and disasters. These include actions to build the gender mainstreaming capacity of MEIDECC, the National Emergency Management Office and civil society organisations, and to make available and disseminate information on gender, climate change and disaster preparedness.

The JNAP2 references the Women's Empowerment and Gender Equality Policy and makes broad statements about the varying impacts of climate change and disasters on different groups within society. It acknowledges the role of women in the informal sector, particularly in small-scale farming and fisheries, and the production of handicrafts. It further recognises that adaptation support is required to assist women involved in these activities to better cope with the impacts of extreme climatic events such as drought and cyclone. One target against which progress of the JNAP2 will be measured is "Gender equality and social inclusion for resilient development"⁷⁹. The Women's Empowerment and Gender Equality Policy has a specific action to support the DCC in meeting this gender target (Outcome 5).

In terms of participation in climate change decision making processes, gender and social considerations are incorporated into Tonga's resilience planning for climate change and disaster impacts through Women's Affairs

⁷⁸ The formulation of the Women's Empowerment and Gender Equality Policy was supported by the Pacific Community (SPC), SPC Regional Rights Resource Team, UN Women, UN Population Fund, UNDP, International Planned Parenthood Federation and the Australian Government's Pacific Women Shaping Pacific Development.

⁷⁹ JNAP2, p.42

Department representation and participation in the JNAP Taskforce and the MIA's attendance of the National Climate Change Coordinating Committee and the National Emergency Management Committee. The Women's Affairs Department and the MIA play key roles in advocating for equality and inclusion in all development sectors.

Box 11: National Tongan Safety and Protection Clusters

The MIA chairs the Safety and Protection Cluster, which along with eight other inter-agency groups constitute the national humanitarian cluster system in Tonga. The clusters include (with the cluster chair in parentheses):

1. Communications (Department of Communications within MEIDECC)
2. Inter-Cluster Coordination (National Emergency Management Office)
3. Education (Ministry of Education and Training)
4. Essential Services including power, water and telecommunications (Ministry of Public Enterprise)
5. Food Security and Livelihoods (Ministry of Agriculture, Food, Forests and Fisheries)
6. Coordination/Logistics (National Emergency Management Office)
7. Safety and Protection (MIA)
8. Emergency Shelter (National Emergency Management Office and Tonga Red Cross Society)
9. Health, Nutrition, Water, Sanitation and Hygiene (Ministry of Health)

The Safety and Protection Cluster was established in 2014 and its membership includes the MIA, National Emergency Management Office, Ministry of Police, Ministry of Health, women's groups, Tonga Red Cross and MIA district officers. It is the largest cluster in terms of its membership size. There are three sub-groups in the cluster: child protection and emergencies, Gender Based Violence and psycho-social support. The Cluster meets monthly during the cyclone season (November-April) and quarterly at all other times. The collection of age, gender and disability data of evacuees and persons affected has been included as a requirement of the Standard Operating Procedure for Cyclone Response.

How Climate Change Information is Used

Climate change information, in particular meteorological data and information products are used and disseminated by MIA staff. Climate outlooks for rainfall and temperature, weather bulletins and tropical cyclone advisories are acquired from the Tonga Meteorological Service via email, which the MIA staff pass onto national humanitarian cluster groups, district and town officers, and district emergency response committees. The MIA also provides all district officers with mobile phones, which allow them to receive regular weather updates from the Tonga Meteorological Service.

Beyond this, the utilisation of scientific data and climate change information (i.e. reports, policies) for informing and guiding MIA's work in the area of gender equality, social inclusion and community planning is very limited despite the Women's Empowerment and Gender Equality Policy having a specific priority outcome of creating "equal conditions to respond to natural disasters, environmental challenges and climate change".⁸⁰

There is ample evidence of weather alerts and forecasts being made widely available to MIA staff, including district and local officers, however such information appears to be shared with communities, rather than used for policy and technical analyses to inform MIA activities. For example, the information is not applied to identify potential implications of climate change risks and natural hazards on the different social groups, nor in designing solutions to promote equality and inclusion aspects of climate change policies, projects and activities in Tonga.

⁸⁰ Women's Empowerment and Gender Equality Tonga Policy, p.8

This may be due to the nature of the language used, including technical terminology, and individuals lacking capacity or skills to interpret the data.

How Gender and Social Information is Used within Climate Change Activities

Contrary to climate change information, which is merely being shared and not applied, gender and social data is used by MIA for humanitarian response planning and by MEIDECC for assessing climate change and disaster vulnerabilities.

Collecting age and sex disaggregated data is also a priority for the Safety and Protection Cluster. The Cluster used age, sex and disability data from the national census in Tongatapu and 'Eua to identify female headed households, children, youth, the elderly and people with disabilities who are in the highest quintiles of poverty (measured by the level of household assets and material possession). The analysis was disaggregated by sex and it identified the target beneficiaries for the Cluster's Tropical Cyclone (TC) Gita Recovery Plan and the types of specific recovery activities that should be delivered to each group, such as providing psychosocial support services to people with disabilities and training affected women in handicrafts, small-scale farming and microfinance to help diversify their livelihood options. Through donor funding, grants were issued to the Cluster to fund the identified recovery activities for vulnerable groups in Tongatapu and 'Eua.

In developing the JNAP2, the MEIDECC worked in collaboration with the MIA to review Community Development Plans, a local planning instrument for all villages in Tonga. The Community Development Plans review was useful in understanding community and social inclusion issues and how they relate to climate change adaptation and disaster risk management. Whilst the linkage was not explicitly stated in the Community Development Plans, some of the identified needs of the community relate to climate change and disaster impacts, and resilience building. The MEIDECC used the findings and recommendations of the Community Development Plan review to develop the key actions in the JNAP2.

Information Types and Sources

Meteorological data is reported to be the only type of climate data used by MIA staff. The MIA disseminates weather bulletins and forecasts cyclone warnings and other advisory statements from the weather bulletins and forecasts to communities and district emergency management committees. MIA staff usually approach MEIDECC for climate change information in the first instance. They also use reports and publications available from the websites of IPCC, SPC, SPREP and University of South Pacific (USP).

The types of non-climate data used by MIA staff are shown in Table 11. The non-climate data is used for developing project proposals, design documents and concept notes, community and stakeholder consultation, project monitoring and evaluation, policy formulation and review, and project- or sector-specific assessments. The MIA staff source non-climate data from the Statistics Department, other government ministries and civil society organisations.

Table 11. Data Categories and Information Sources used by MIA

Categories of Data Used		
Agriculture	Education	Meteorological
Demographic (age, sex, population and households)	Economic (employment, income)	Other Social (crime, migration)
Disability	Health	Protection (child and family, domestic violence)
Climate Change Information External Sources Used		
IPCC	SPREP	
SPC	USP	

The members of the Safety and Protection Cluster collect gender and social data for the purpose of applying for funding and preparing project acquittal reports. These documents are shared with the Cluster members, but the Cluster does not actively capture, store or manage the data or reports.

Other government agencies and civil society organisations collect quantitative and qualitative data on gender and social issues for their particular organisational or project purpose, not necessarily related to climate change. For instance, the Tonga National Youth Council collects and uses data on youth population, education, employment, health and other indicators. The Tonga Police Service has data on domestic violence and crime.

Current Challenges

There are numerous requests from communities on the outer islands for scientific data on climate change, including requests from high school students studying geography and from community members preparing grant proposals. Often these requests are difficult to meet by government officers stationed in the outer islands as they have limited internet access.

According to MIA staff interviewed for this study, the procedure for requesting and acquiring information from other ministries is archaic and lengthy. The information request has to be formally made through a letter to the CEO of the relevant ministry. The Gender Based Violence subgroup of the Safety and Protection Cluster requested crime data during TC Gita to substantiate anecdotal reports of increased crime in Tongatapu. Several months have passed and the data request is still being processed. It has been suggested by MIA staff that making government reports, data and other documentation available through a central agency like the Statistics Department or through the government intranet would facilitate greater information access and discoverability.

There is a general assumption that everyone is included in all aspects of community affairs in Tonga because it is a communal society. However, when the issue is examined in more detail, the inequalities and barriers to participation are revealed. This is a constant challenge faced by Women's Affairs Department officers and in response they assist with debunking assumptions and questioning the extent to which all social groups have been engaged and consulted in local planning and community development processes. There are also assumptions within society that gender equality is only for women and Women's Affairs Department officers are working towards educating people about the importance of both men and women in achieving equality. As explained by one of the informants, "MIA district officers are mostly men. The issue is their mindset. They need to know that gender is not about promoting women but about equality. This education is important for making sure they feel comfortable with the topic".


These assumptions and misunderstandings have broader implications on the application of data and information. Put simply, even if age, sex, disability and other social data is being collected, if it is not being analysed and applied to address the inequalities between different groups in the communities, then it only maintains the status quo. Planning for a sustainable and resilient future for Tonga requires understanding the differences in vulnerabilities and adaptive capacities of different groups in the community, and applying this understanding to bring about positive changes to social inclusion and the empowerment and the participation of vulnerable people.

Existing Good Practices and Future Opportunities

Prior to Tropical Cyclone Gita in February 2018, the collection of age and sex disaggregated data for disaster risk planning and emergency response was predominantly undertaken by the Tonga Red Cross. However, there is now a Monitoring and Evaluation Officer within the Women's Affairs Department whose primary responsibility includes collecting and reporting on age, sex and other social data to better guide and inform the work of the department.

The Safety and Protection Cluster is currently embarking on a new initiative to spatially map vulnerable groups (men, women, youth, children, people with disabilities and elderly people) using the demographic data from the national census. The data will be disaggregated down to the village level. This information will be used by the Cluster and shared with District Emergency Management Committees to assist with planning appropriate response for evacuation, and emergency relief and assistance.

Outcome 2 of the JNAP2 focuses on research, monitoring and management of data and information. Under this outcome, capacity building in data analysis is among the top priorities identified for enhancing climate change data and information management. Given available data and information is shared but not widely applied for technical analysis, the identified priorities are an affirmative step forward not only in increasing understanding



of gender and social dimensions of climate change and disasters, but in increasing the application of data and information in general for development planning and decision making. Investing more resources and training in data analysis and gender analysis for MIA, MEIDECC and other ministries is likely to lead to better informed decisions.

Summary

Meteorological data and information products are widely disseminated by MIA staff working at the district and community levels. Generally speaking, climate change information is shared by those working in gender affairs and community development but not analysed or applied in a way to inform gender and social assessments, or climate change and disaster risk management planning. The roll out of the JNAP2 will see further actions being undertaken to better understand the climate change vulnerabilities and adaptation needs of diverse social groups and to apply this understanding to implement projects and activities that contribute towards Tonga's vision for resilient development.

TUVALU

Three case studies have been compiled for Tuvalu which examine how climate change information is being used for national adaptation planning, coastal management and gender and social inclusion. Due to the outcome of the general election held in September 2019, the names of departments and ministries may have changed since this study was undertaken.

NATIONAL ADAPTATION PLANNING

The Context

Tuvalu is in the preliminary stages of developing its National Adaptation Plan (NAP) to identify medium to long-term adaptation needs. A qualitative vulnerability assessment of all nine islands has been completed thus far and Tuvalu's funding proposal to complete the NAP process will be submitted to the Green Climate Fund (GCF) in October 2019. With financial support from the GCF, Tuvalu seeks to develop its NAP by 2020.

Adaptation decisions are generally driven by the goals and priorities outlined in Tuvalu's National Sustainable Development Strategy, *Te Kakeega III*, and the outcomes of UNFCCC and other international, regional and sub-regional agreements on climate change.⁸¹ The Climate Change Resilience Act came into effect in 2019, which enshrines the Paris Agreement obligations into domestic law. The NAP, combined with the Mitigation Action Plan (MAP) will provide a detailed and costed blueprint for addressing medium and long term adaptation needs, and for achieving the goal of 100 per cent renewable energy in electricity generation by 2025.

The Department of Climate Change and Disaster (DCCD) under the Office of the Prime Minister (OPM) is leading the NAP process. A new national climate change policy is being prepared by the DCCD to deliver an overarching policy framework for the NAP and the MAP. The NAP will build on the work of the previous National Adaptation Programme of Action (NAPA) and related projects to address medium and long term adaptation needs (see Box 12).

There are several layers of decision making within the government for adaptation planning. National level decision making processes include DCCD, National Advisory Council on Climate Change, the Prime Minister (as the Minister responsible for climate change) and the Cabinet. Decisions are made using both top-down (directive from the Prime Minister or Cabinet) and bottom-up (driven by community demand or needs) paths, depending on the issue. At the highest level, the Prime Minister has considerable influence on climate change decisions. At the strategic and operational levels, the decision-making power rests with the Director of DCCD.

Collective decisions are made through the National Advisory Council, which is chaired by the Secretary to Government and its membership comprises of directors from government departments and representatives from Tuvalu Red Cross, Tuvalu National Private Sector Organisation, Tuvalu Association of NGOs and Tuvalu National Council of Women. At its monthly meetings, new projects and progress of existing national adaptation and mitigation projects are presented to National Advisory Council for discussion. The National Advisory Council members also advise on development and review of national climate change policies. The DCCD uses NACCC as a platform to share information and to integrate climate change issues across key sectors.

⁸¹ Tuvalu is a member of sub-regional alliances such as the Coalition of Atoll Nations on Climate Change, Polynesian Leaders Group and the Alliance of Small Island Developing States.

Box 12. Tuvalu's National Adaptation Programme of Action

Tuvalu submitted its National Adaptation Programme of Action (NAPA) to the United Nations Framework Convention on Climate Change in 2007. The NAPA is a mechanism established by the Conference of Parties to implement Article 4.9 of the Convention in order to support Least Developed Countries (LDCs) address their particular climate change vulnerabilities. Tuvalu's NAPA identified seven priority areas of urgent and immediate adaptation needs, including:

1. Coastal areas: increasing resilience of coastal areas and settlements to climate change;
2. Agriculture: increasing subsistence pit grown *pulaka* (traditional taro) productivity through introduction of a salt-tolerant *pulaka* species;
3. Water: adaptation to frequent water shortages through increasing household water capacity, water collection accessories, water conservation techniques and construction of seawalls to minimise saltwater intrusion;
4. Health: strengthening of community health through control of vector borne/climate sensitive diseases and promotion access to quality potable water;
5. Fisheries: strengthening of community based conservation programmes on highly vulnerable near-shore coastal shellfish, fisheries resources and coral reef ecosystem productivity.
6. Marine ecosystems: Increasing information on the relationship between marine productivity and climate change; and
7. Disaster: strengthening community disaster preparedness and response potential.

Subsequently, NAPA I and NAPA II projects funded by the Global Environment Facility (GEF) LDC Fund were implemented to address these identified priorities, with the exception of health. The adaptation priority on health is currently being addressed through two projects: "Climate Change and Health Adaptation in Pacific Islands" project (2018-2022) funded by the Korea International Cooperation Agency (KOICA) and "Building Resilience of Health Systems in Pacific Island LDCs to Climate Change" project (2019-2023) funded by GEF LDC Fund and managed by the World Health Organisation. Both projects are implemented through Tuvalu Ministry of Health. These projects will strengthen the capacity of the Ministry of Health in the areas of disease surveillance monitoring and analysis to better plan for and respond to climate-induced health risks such as water borne diseases and dengue outbreak.

How Climate Change Information is Used

The DCCD is using climate change information for a broad range of applications. These include using climate data and information on vulnerabilities for developing concept notes and project proposals, developing and reviewing policies and legislation, carrying out project- and sector-specific assessments, conducting consultation and awareness training, and national communication reporting for the UNFCCC.

The outcomes of the UNFCCC and scientific publications of the Intergovernmental Panel on Climate Change (IPCC), such as the *Special Report on Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways* are commonly used by the DCCD and government leaders to strengthen Tuvalu's policy position on climate change and to rally regional allegiance towards protecting small islands at the forefront of climate change.

Climate predictions for variation in sea level, temperature (surface and sea), precipitation and cyclonic activities are used to highlight areas and sectors most vulnerable to climate change impacts, and in turn to identify key

activities for inclusion into project proposals and design documents. The GCF funded Tuvalu Coastal Adaptation Project (TCAP) is one such example (see case study below on 'Coastal Management').

Qualitative data is also collected and assessed by DCCD for national adaptation planning. In early 2018, Tuvalu commenced the NAP process by completing community vulnerability analyses for all nine islands with financial and technical assistance from the Canadian-based International Institute of Sustainable Development (IISD). The methodology for the Tuvalu Integrated Vulnerability Assessment (TIVA) was based on the IVA Framework developed by the Pacific Centre for Environment and Sustainable Development (PACE-SD) of the University of the South Pacific (USP). The approach uses a narrative and a subjective scoring system for communities to describe and measure how well their existing livelihood assets meet human security needs in the face of changing climate conditions.⁸²

Tuvalu Integrated Vulnerability Assessment

Livelihood assets: natural resources, infrastructure and services, financial resources, human skills and institutions and governance

Human security: ecosystem health, community health, security of place, water security, food security, energy security and income security

There are five livelihood assets and seven human security elements covered by the TIVA. Initial training on the TIVA framework and data collection methods was delivered by IISD to the TIVA team, which included officers from DCCD, other government departments and Tuvalu Red Cross Society. After the training, the team travelled to each island to garner views from three key groups: men, women and youth. The data was directly recorded on a data collection tool called Fulcrum using tablet devices. The DCCD is currently analysing the data and preparing it for visualisation.

Box 13. Collecting and Applying Property Data for the Climate Change and Disaster Survival Fund

The DCCD engages in its own data collection initiatives. In addition to TIVA, another example of primary data collection is the property audit carried out for the establishment of the Property Registration System (PRS). The DCCD led the process of conducting audits of all physical buildings and dwellings on nine islands between 2016 and 2017. Audit teams comprising of staff from the DCCD and the Public Works Department (PWD), and local volunteers recorded the age, condition, size, location, estimate value and occupier details of each property, as well as the type and number of latrines and water reserves. The data was entered into the PRS database, which is maintained and updated by the DCCD. The information from the PRS is being used to calculate and decide on the level of financial assistance that can be allocated from the Tuvalu Climate Change and Disaster Survival Fund to help affected households repair and rebuild their homes after a major climate change or disaster event.

In 2018, the New Zealand National Institute for Water and Atmospheric Research (NIWA) introduced RiskScape software to enable the DCCD to estimate the impacts of rainfall and water availability on demand for imported bottled water and coconuts (as a substitute for drinking water) to inform drought management and response. The Funafuti dataset from the PRS was used to develop a customised model for the capital, where nearly half of Tuvalu's population resides. The DCCD will use RiskScape to develop scenarios for the water security element of the NAP.

The DCCD recognises the wider applications and benefits of the data collected for the PRS, such as for controlling building development by island governments, informing the development of the national building code and for humanitarian assistance and response. The DCCD is liaising with relevant departments and island administrations to link the PRS to other sectoral planning processes.

⁸² Pacific Centre for Environment and Sustainable Development. (2017) Pacific Islands Integrated Vulnerability Assessment Framework: A Guide for Community Resilient Development. University of the South Pacific, Fiji.

The outputs of the TIVA will be used for identifying community vulnerabilities and adaptive capacity to inform the formulation of the NAP and to compile the socio-economic baseline for TCAP (see 'Coastal Management' case study for more details). Another recent example of data collection undertaken by the DCCD to support climate change and emergency response decisions is presented in Box 13.

Information Types and Sources

Meteorological data including historical rainfall records, chronological list of extreme weather events such as cyclone, drought and flooding, weather forecasts (including weather, rainfall, wind gusts and speed, and wave swells), tidal calendar and climate and cyclone outlooks are available through the Tuvalu Meteorological Service. Using forecasting tools developed by the Australian Bureau of Meteorology, Tuvalu Meteorological Service also produces monthly rainfall, ocean and El Niño-Southern Oscillation (ENSO) outlooks.⁸³ The weather bulletins and forecasts, and climate outlooks are widely distributed to public service staff, island governments and the public through email communication and local broadcasting on radio. The island governments rely on national government for weather and climate change-related information.

Presently, the Tuvalu Meteorological Service does not generate climate change projections. The projections produced by the Australian Bureau of Meteorology in 2011 as part of the Pacific Climate Change Science Program is available online and in printed format. They are the only set of country-specific projections publicly available at this present point in time.

Other types of data used by DCCD are shown in Table 12. They are acquired through different sources, some with extreme difficulty (this is further elaborated in the 'Current Challenges' section). The DCCD also uses available documents and published reports to source these types of data. Most commonly used sources of climate change information are also shown in the table below. Specific information products and tools from Climate Analytics, NIWA and Australian Bureau of Meteorology are also used by DCCD staff.

Table 12. Data Categories and Information Sources used by DCCD

Categories of Data Used		
Agricultural	Financial	Infrastructure
Demographic	Geographic (coastal)	Meteorological
Economic	Geomorphological (topographic and bathymetric)	Oceanographic
Environmental	Health	Property
Energy and Emissions	Hydrological	Social (gender, migration, education)
Climate Change Information External Sources Used		
Australian Bureau of Meteorology	NIWA	SPREP
Climate Analytics	Pacific Climate Change Portal	UNFCCC
IPCC	SPC	USP

Current Challenges

Numerous challenges associated with climate change information have been identified by informant DCCD staff. Acquiring accurate and reliable data from other departments is an ongoing challenge faced by technical officers in DCCD. There is a common practice of storing data, reports and other digital information on laptops, personal computers and external hard drives instead of a central repository or in a shared drive, which severely limits accessibility and discoverability of information. DCCD staff spend excessive time searching for data and reports online or tracking down people who may have them. Some attempts have been made by the DCCD to store all departmental documents onto a single computer which is also used as a backup in case the files are lost or

⁸³ The Australian Bureau of Meteorology has delivered various programs that focused on climate forecasting and the production of climate information products. They include the Pacific Islands Climate Prediction Project (2003-2012) and the Climate and Ocean Support Program in the Pacific (2013-2016).

damaged. The process of developing a new national climate change portal through the Pacific iCLIM Project has further prompted DCCD to undertake a data stocktake, and collate and store files in one location for ease of uploading them onto the portal.

Whilst DCCD is proactively collecting primary data, it has been noted from the informants that there is no consistent method or minimum standards for data collection. This is an issue for activities that require longitudinal observation and analysis, such as UNFCCC reporting which necessitate demonstration of changes that have occurred over time in reducing national greenhouse gas emissions or in enhancing adaptation capacity to climate change impacts. Inconsistent methods and ad hoc collection of data are not conducive to data reuse and comparative analysis, which may thwart climate change planning and decision making.

Duplication of studies and assessments has also been noted as a recurrent problem. Study findings and reports are not always shared with relevant stakeholders and many similar assessments (i.e. vulnerability assessments) are carried out across communities. Another issue is the lack of information sharing culture between government ministries, although this is improving gradually as exemplified by the cooperative information sharing practice between DCCD and Tuvalu Meteorological Service. Presently, information exchange is occurring through personal relationships and interactions among individual staff. The desire to make climate change information more readily available for staff in the Office of the Prime Minister and other ministries, and for school and university students has been expressed by senior management of Office of the Prime Minister.

Other key issues identified in interviews include the need for improving access to decision support tools, building DCCD technical capacity in data analysis, maintaining up to date records of climate change data and information, and having an independent body to authenticate the accuracy and the credibility of climate change data.

Existing Good Practice and Future Opportunities

Climate change information is disseminated to the public through joint efforts of DCCD, Tuvalu Meteorological Service and Tuvalu Red Cross Society. Historical data on extreme events such as cyclones, flooding, drought and king tides, and information on climatic conditions in Tuvalu are routinely shared as part of awareness raising, training and consultation on climate change and disaster risk reduction with island leaders and communities. All information presented to communities are translated and explained in the Tuvaluan language.

Instigated by DCCD, inter-agency collaboration in collecting climate change information has contributed to its wider application across the different sectors in Tuvalu. There are clear co-benefits in joint data collection efforts to reduce duplication and to maximise the use of available resources. Understanding between government agencies in sharing data for a common purpose can be advantageous for both planning and decision making (see example in Box 14).

Informants noted an opportunity to disseminate climate change information through the government intranet and through the national climate change portal being developed through the DFAT-funded Pacific iCLIM Project to increase accessibility and discoverability of information. Furthermore, strengthening organisational systems and procedures for managing information (not only climate change but information in general) is a key area requiring attention as more complex data and assessments will be generated through the NAP process and the implementation of TCAP.

Box 14. Inter-agency Drought Monitoring using Meteorological and Water Reserve Data

Meteorological data was used during the dry spell in April-May 2018. Using dynamical and statistical models, the Tuvalu Meteorological Service generated a monthly rainfall prediction for four islands that have weather stations (Nanumea, Nui, Funafuti and Niulakita). The results of the rainfall modelling were validated by comparing them with the rainfall record from the previous year (for the same month) and rainfall forecast for the next seven days. Based on this analysis, the threshold for meteorologically defined drought was reached for Funafuti and Nanumea islands. This indicator alone was not sufficient for drought to be officially declared. The other indicator was the volume of water in government and communal water cisterns. The Public Works Department's (PWD) Water Division monitors and records the amount of water in each of the government cisterns in Funafuti. For the outer islands, local authorities are responsible for checking the water volume of communal cisterns. Using this data, PWD calculated the combined water reserve in Funafuti which was still slightly above the critical threshold. The DCCD as the control agency for drought, held weekly meetings with the Tuvalu Meteorological Service and the PWD to share updated data and to monitor the situation. In the meantime, the DCCD issued advisories to notify the public about the dry conditions and the need to conserve water. Fortunately for Tuvalu, the critical thresholds were never reached. DCCD staff spoke of the event as a positive experience: *"New information collection and analysis every week helped us make the best possible decisions"*.

Summary

There is a notably diverse practice of collecting, applying and reusing climate change information by DCCD, both with other Tuvalu government agencies and civil society. As the examples provided by informants to this case study reveal, collaborative arrangements with these internal and external stakeholders can, and has, resulted in broader uses and dissemination of information, which is important for integrated planning on climate change. As the NAP formulation gets underway, enabling and supporting a whole-of-government culture of information sharing will be critical to this process, and the DCCD will play a key role in managing and brokering climate change information to different sectors and levels of decision making.

COASTAL MANAGEMENT

The Context

Sea level rise is a major threat to the low-lying islands of Tuvalu. The nine atoll and reef islands have an average height above sea level of less than three metres, and are surrounded by over a million square kilometres of ocean. Thus, managing the risks of coastal inundation associated with extreme weather events and sea level rise is a priority for the country.

Past initiatives on coastal protection have been small-scale, short-lived and ineffective. These include 'sea defence' systems along the Funafuti shoreline using gabion baskets and concrete rock revetments, coastal vegetation planting (under NAPA I project) and a beach nourishment pilot using gravel and sand with rock groins to curb tidal flows. Gabion baskets have been used on all islands and concrete block sea walls have been erected, and are now damaged or in disrepair, in Nanumaga, Nukulalelae and Nukufetau. Engineered coastal protection measures involve high capital investment and ongoing maintenance, which are costly in the short term but have benefits over the long term. Previous initiatives have had limited financing, which curtailed any efforts to provide a comprehensive response that could endure the increasing impacts of sea level rise and tropical storms.

The Government of Tuvalu in partnership with the United Nations Development Programme (UNDP) developed a proposal to the GCF for the Tuvalu Coastal Adaptation Project (TCAP). In June 2016, the GCF Board approved US\$36 million towards the project with US \$2.86 million in co-financing from the Government of Tuvalu. The aim of the seven year project (2017-2023) is to reduce the impact of sea level rise and other climate change impacts on key coastal infrastructure in the islands of Funafuti, Nanumea and Nanumaga.

Tuvalu Coastal Adaptation Project Outputs

- a) Strengthening institutions, human resources, awareness and knowledge for resilient coastal management
- b) Reducing vulnerability of key coastal infrastructure against wave induced damages in Funafuti, Nanumea and Nanumaga
- c) Establishing a sustainable financing mechanism to support long term adaptation efforts

The project is managed by UNDP as an accredited entity to the GCF. The project is implemented in partnership with the Government of Tuvalu via the DCCD. The TCAP Project Management Unit has seven staff (three local and four international) and is based in the same building as DCCD in Funafuti. The membership of the TCAP Board comprises Directors from DCCD and the Department of Rural Development, the Resident Representative of UNDP Pacific and Tuvalu's Prime Minister as the Chair of the Board. The Prime Minister is the National Designated Authority to the GCF. This is the first coastal adaptation project being overseen and managed by DCCD. Previous projects have been executed through different agencies within national government, including the Public Works Department (PWD), the Department of Environment and the Ministry of Communication and Transport, as there is no clear designated national agency on coastal management.

As TCAP is the first project in Tuvalu to be funded by the GCF, and because its allocated funding is proportionally large compared to past donor-funded climate change projects, there is great expectation placed on the project. In the near future, the Government of Tuvalu plans to submit additional proposals to the GCF to design and construct appropriate coastal protection measures in the remaining six islands not covered by TCAP.

How Climate Change Information is Used

To date, informants reported that climate change information and qualitative data from consultations has been used for implementing and refining specific components and activities of the TCAP. Specifically, climate and non-climate information has been used to revise the coastal protection measures for the three islands.

Key informants for this study reported that in the inception stage of the project, extensive consultations were undertaken with the national government, island leaders and councils, and communities on the three islands to understand their concerns, views and requirements for coastal protection. The community indicated a strong desire for TCAP to continue the reclamation works of the Fongafale Lagoon, undertaken by the Government of Tuvalu between 2017 and 2018. The reclaimed area (approximately 2.85 hectares) was funded through public financing, and overlapped with the target shoreline of the original TCAP proposal which was submitted to the GCF in 2016. As the government's reclamation works had altered the baseline conditions, it was necessary for TCAP to review the approaches for coastal protection.

In 2018, technical assessment of shoreline processes and hazards (including cyclone induced wave action) was undertaken for each site. Topographic data was used to prepare a shoreline profile and to determine the elevation of coastal protection measures against the highest astronomical tide. The findings of the technical assessments and consultations⁸⁴ resulted in significant changes being made to Output 2 of the project, *"Reducing vulnerability of key coastal infrastructure against wave induced damage in Funafuti, Nanumea and Nanumaga"*, as shown in Table 13.

Table 13. Changes to TCAP Output 2 Coastal Protection Approaches

Island	Initial Proposed Approach	Revised Approach	Benefits of Revised Approach
Funafuti	600 m rock armour revetment and 400 m pre-cast concrete revetment	Reclamation of approximately 7.8 ha of the foreshore area in Fongafale lagoon and protection of 780 m of adjoining shoreline	<ul style="list-style-type: none"> Reclaimed land will be at an elevation well above the IPCC sea level projection for the year 2100 Reclaimed land will have the highest elevation point in Funafuti, making it a safe location Provide a recreation space for the community and a safe location for a cyclone shelter
Nanumea	760 m geo-textile container revetment	Raised sloping barrier (Berm Top Barriers) protecting 1,367 m of shoreline and 150 m precast concrete unit revetment	<ul style="list-style-type: none"> Recognises the active natural shoreline processes Simple, low cost and effective Environmentally unobtrusive Allows foreshore access 150 m shoreline in front of the church will be reinforced
Nanumaga	450 m geo-textile container revetment	Berm Top Barrier protecting 643 m of shoreline	<ul style="list-style-type: none"> Recognises the active natural shoreline processes Simple, low cost and effective Environmentally unobtrusive Allows foreshore access

Source: TCAP Funding Proposal, 2016 and TCAP Consideration of Restructuring Paper, 2019

⁸⁴ Refer to TCAP Funding Proposal (2016) and TCAP Consideration of Restructuring Paper (2019) which are available on the GCF website: <https://www.greenclimate.fund/projects/fp015>

The revised approach for the three sites involves coastal reclamation and fortification to protect a total of 3,090 metres of shoreline. For Funafuti, reclamation on the lagoon-facing shoreline is expected to have a surface elevation of two metres above the highest measured sea level recorded in Funafuti to ensure its viability beyond a 2100 worst case scenario for sea level rise rates projected by IPCC. The design is also sufficient to withstand future storm-induced wave overtopping and coastal flooding. There are plans for the reclaimed land to be developed as public open space with potential for a dual purpose community hall and cyclone shelter to be constructed. A detailed Funafuti Foreshore Landuse Plan will be developed as part of TCAP to guide strategic land use planning of the site. For the other two islands, the raised sloping barriers, referred to as Berm Top Barriers, are considered to be simple, relatively low cost and highly effective measures that support the natural shoreline system and beach sedimentary processes. The barriers can be increased in height and extended, and repaired using locally available resources. For this reason, the Berm Top Barriers have been identified as a more appropriate measure than the geo-textile container revetments suggested in the original proposal.⁸⁵

In July 2019, the GCF approved changes to the coastal protection approach for the three islands, but placed certain conditions on the project including a requirement for a full and complete Environmental and Social Impact Assessment prior to the commencement of construction works for Output 2. Full disclosure of the Environmental and Social Impact Assessment and the associated Environmental and Social Management Plan is a condition to the disbursement of funds for Output 2.

Information Types and Sources

A diverse variety of data and information is used and generated as part of TCAP implementation. For coastal assessments, bathymetric and topographic data is being collected and used. Vulnerability assessments are being carried out using both existing and newly assembled data and information on the physical environment (e.g. climate, geography, geomorphology, land use, marine ecosystem), coastal hazards and socio-economic conditions.

In May 2019, TCAP commissioned a Light Detection Ranging (LiDAR) survey of all nine islands in Tuvalu. This was the first time that a LiDAR survey had been carried out for all islands. The LiDAR survey provides detailed sea floor mapping of near shore lagoon (up to 50 metres in depth) and land elevation data which will be used to form the baseline for the vulnerability assessment and shoreline monitoring, and for informing the design of reclamation and fortification activities for the three islands covered by the TCAP.⁸⁶ The DCCD will also use this information to identify coastal vulnerabilities and associated adaptation needs for inclusion into the NAP.

Categories and sources of data and information used for TCAP are presented in Table 14. Climate change information from external agencies include climate change projections from the IPCC and Australian Bureau of Meteorology, studies and technical reports from SPC and UNDP. The GCF website, publications and news are also used by TCAP staff to keep track of GCF Board decisions and any updates that may affect the contractual obligations of TCAP.

⁸⁵ Further information on the recently approved changes to the TCAP project scope and design is available at:

https://www.greenclimate.fund/documents/20182/1674504/GCF_B.23_13_Add.01_-_Consideration_of_restructuring_paper_Addendum_I_FP015_RP1.pdf/fee49609-af73-cfb5-627e-9799ebadde3e

⁸⁶ The details of the LiDAR survey are available from:

<http://www.pacific.undp.org/content/pacific/en/home/presscenter/pressreleases/2019/advanced-topographic-bathymetric-survey-to-support-tuvalu-adaptation-efforts.html>

Table 14. Data Categories and Information Sources used for TCAP

Categories of Data Used		
Demographic	Geographic (coastal)	Meteorological
Economic	Geomorphological (topographic and bathymetric)	Oceanographic
Environmental	Infrastructure	Property
Climate Change Information External Sources Used		
Australian Bureau of Meteorology	IPCC	UNDP
GCF	SPC	

Current Challenges

The technical nature of Output 2 presents challenges in communicating information and data to a non-technical audience. DCCD and other government departments do not have technical capacity in coastal management or engineering. They rely on technical experts to provide the necessary information and analyses, and to explain what the results mean for protecting key coastal infrastructure from increasing sea levels and storm activity. It is even more challenging for TCAP and DCCD staff to explain technical information to people in the community in a way that is easy to understand and in the local language. TCAP has local staff who often serve as translators during community consultations. Useful data and information generated from TCAP are communicated through fact sheets and news articles published on the project website however they are mostly in English. Designing documents in a format and language that supports the needs of end-users (DCCD, government and communities) would ensure the data and information collected and produced by TCAP are used effectively for broader adaptation planning and decision making purposes.

Informants also reported the challenge of not having any qualified coastal scientists or engineers in Tuvalu. Technical data and information from TCAP require specialist knowledge and tools to interpret and analyse. To some extent this is being addressed through activities under Output 1 of TCAP. There are currently two Tuvaluans studying undergraduate degrees in coastal engineering and geo-spatial planning at tertiary institutions in Australia and New Zealand through scholarships offered by TCAP. These graduates will return to Tuvalu and will be employed by the project. Nevertheless, technical skills are needed both now and in the future to implement coastal protection works under TCAP and subsequent coastal adaptation projects. Without proper capacity building and skills transfer, there is the risk of information and knowledge being lost once the project comes to an end. Regrettably, informants reported that this has occurred with previous projects in Tuvalu, impeding the ability to understand what lessons have been learned and how they affect current initiatives like TCAP.

Due to a lack of technical information and understanding about local conditions, past coastal protection measures are considered to be maladaptive. For example, the construction of a seawall in Nukufetau in 1985 did not take into account the natural shoreline processes such as sand movement and sedimentation, and local knowledge of tidal and flooding events, which led to a concrete block sea wall being constructed. The wall was damaged shortly after it was erected, again increasing the vulnerability of the island from the storm-induced wave action and sea level rise. To avoid maladaptive practices, one of the interviewees argued that “Better scientific data and technical assessment is needed, particularly the recognition of local knowledge from people who live on the island.” Examining how TCAP captures and applies local knowledge to inform the design and implementation of coastal protection measures is of interest to DCCD.

Existing Good Practice and Future Opportunities

There is potential for coastal hazards, environmental and social data and information generated by TCAP to be used for broader applications in coastal and land management, environmental and marine conservation, social and health services planning and community development. Bathymetric data from the LiDAR survey can also be used for maritime navigation.

In December 2018, UNDP and SPC agreed to work together in undertaking coastal hazard assessment and Environmental and Social Impact Assessment required for the second output of TCAP. Under the agreement, the SPC Geoscience, Energy and Maritime Division will carry out coastal hazard and vulnerability assessments for Funafuti, Nanumea and Nanumaga. The coastal hazard assessment will examine shoreline vulnerability and stability (i.e. coastal geology, geomorphology, tidal and nearshore wave action), and coastal land uses and infrastructure. SPC will also deliver training in shoreline mapping to DCCD, other relevant national agencies and local authorities. Although there are countless vulnerability assessments already in existence with varied approaches and purposes, SPC indicated that the vulnerability assessment to be carried out as part of TCAP will be the most detailed and comprehensive analysis of coastal hazards to be undertaken in Tuvalu.⁸⁷ The outcomes of the vulnerability assessment will inform detailed design of the coastal protection measures to be implemented by TCAP. The training element of SPC's support to TCAP is intended to build the capacity of national agencies in monitoring coastal change and conducting their own technical assessments on coastal hazards and risks, and environmental and social impacts. The assessments are currently underway and SPC will use the findings of the Tuvalu Integrated Vulnerability Assessment (TIVA) conducted by DCCD to analyse the socio-economic impacts of climate change on coastal ecosystems.

Considerable progress is also being achieved by the Tuvalu Meteorological Service in coastal inundation modelling. In 2018, SPC assisted Tuvalu Meteorological Service in developing a downscaled offshore wave forecasting model as part of post-TC Pam recovery assistance funded by the German Development Bank. The downscaled model enables forecasting of off-shore wave anomalies for all nine islands. Tuvalu Meteorological Service is currently in the process of establishing a nearshore wave forecasting model with technical support from the World Meteorological Organisation's Climate Risk and Early Warning Systems (CREWS) Project.⁸⁸ The modelling of offshore and nearshore wave action will provide a detailed forecast for coastal inundation which will be used by the Tuvalu Meteorological Service to issue warnings to communities and to help them better prepare for coastal hazards. In addition, a state of the art tide gauge was installed in Fongafale Lagoon in 2017 through the Australian Bureau of Meteorology's Pacific Sea Level and Geodetic Monitoring Project. The tide gauge is transmitting near-real time data via internet link, with local sea level data being collected and captured on the bureau's website.⁸⁹

Summary

The use of climate, environmental and social datasets and information underpins each step of TCAP implementation. Technical assessments conducted as part of TCAP will be a valuable asset to DCCD and the Government of Tuvalu, and have broader applications beyond coastal adaptation planning. Whilst not explicitly defined in the project design, robust and well-informed decisions on coastal adaptation will depend on rigorous analysis and management of data and information, and knowledge transfer as part of TCAP.

⁸⁷ Further details of the agreement between UNDP and SPC is available from: <https://www.spc.int/updates/news/media-release/2018/12/spc-and-undp-partner-to-support-coastal-adaptation-in-tuvalu>

⁸⁸ CREWS is a specialized financing and technical mechanism of the World Bank, the Global Facility for Disaster Reduction and Recovery (GFDRR), the World Meteorological Organization (WMO) and the United Nations Office for Disaster Risk Reduction (UNISDR). CREWS supports Pacific Island Countries in building their capacity in delivering climate services and early warnings to enhance community resilience to climate change impacts. <https://www.crews-initiative.org/en/about-us/what-crews>

⁸⁹ Climate change projections developed and published through Australian Bureau of Meteorology's Pacific Climate Change Science Program are available at: https://www.pacificclimatechangescience.org/wp-content/uploads/2013/06/4_PCCSP_Tuvalu_8pp.pdf

The Context

Tuvalu has a population of just over 10,000 people, with 60 per cent residing in the capital Funafuti.⁹⁰ Eight of the nine islands are Polynesian in ethnic origin whilst the island of Nui, is Micronesian, with its people speaking a dialect of Gilbertese. There is a growing trend in urban migration with people from the outer islands moving to Funafuti in search of employment, education, and access to health services.

The National Gender Policy 2014-2019 is a guiding framework to fulfil the Government's commitment to gender equality and women's empowerment. The Policy has five priority outcomes (see Box 15). The mandate for coordinating the implementation of the policy rests with the Gender Affairs Department (GAD) in the Office of the Prime Minister. GAD currently has a team of five staff. The Australian Government initiative, Pacific Women Shaping Pacific Development (Pacific Women), funded the position of Gender and Social Inclusion Specialist in GAD from 2016 to 2018. The position is currently vacant and is being advertised by Pacific Women.

Within government, GAD works closely with the Education Department, the Youth Desk, the Ministry of Health and the Statistics Department. GAD also works in partnership with civil society organisations such as the National Council of Women on policy and general issues concerning women, and the Tuvalu Family Health Association on reproductive health and nutrition issues. The decisions of GAD are driven by needs and issues of women, girls and island communities. Consultations and visits to the outer islands are regularly undertaken by GAD staff.

The National Social Development Policy 2016-2020 is a separate framework on social service planning and delivery for vulnerable and disadvantaged groups, including people with disabilities, people living in poverty, children, women, youth and the elderly (see Box 16). The Department of Community Affairs (DCA) in the Ministry of Home Affairs and Rural Development is responsible for policy coordination. DCA is a small team of two local staff and up until recently, there was an internationally recruited psychosocial counsellor funded by Pacific Women. The counsellor delivered counselling services to victims of domestic and family violence, and conducted training to expand the network of community-based counsellors. Pacific Women is recruiting a new national counsellor for the DCA.

In implementing the two policies, informants reported that GAD and DCA operate relatively independently. Domestic and family violence is one area where GAD and DCA are working together. GAD focuses on prevention of violence through public awareness raising and tailored training for police officers, whilst DCA focuses on response through counselling services and community protection for victims of violence. The Government of Tuvalu is in the process of developing a separate policy on disability.

GAD has greater involvement in climate change policy and related projects than DCA. The Director of GAD is a member of the National Advisory Committee on Climate Change. GAD was involved in the design of the first and second projects of National Adaptation Programmes of Action (NAPA) through participation in project design workshops and providing background information on gender issues in Tuvalu. To date, DCA has not been involved in any government policy or project planning processes related to climate change.

This case study is based on key informant interviews and surveys conducted with DCCD and GAD staff, and review of relevant policies and reports available online. Due to timing constraints, DCA staff were not interviewed for the study.

⁹⁰ Tuvalu Central Statistics Division. (2017) Population and Housing Mini Census: Preliminary Report.

Box 15: National Gender Policy 2014-2019

Policy Vision: To build a society where women and men are recognised as equal partners in all aspects of development, are protected from all forms of discrimination and violence, and can equally access and benefit from the growth and development of the country.

Policy Outcomes:

1. Increase capacity within all sectors of Government to address key issues of concern in achieving gender equality and women's empowerment within each sector
2. Reflect Government commitments to gender equality and women's empowerment in legislation and in sector policies affecting Government and civil society
3. Create an enabling environment for the full participation of women in economic development
4. Take measures to ensure women's and men's equal access and full participation in decision-making as a means of enhancing leadership and governance at all levels
5. Eliminate all forms of violence against women

Box 16: National Social Development Policy 2016-2020

Policy Vision: Our vision for the future is that individual Tuvaluans will continue to live in a harmonious environment that encourages, improves and supports the cohesion of family, community, and nation within the global community, derived pre-eminently from a deep understanding and acceptance of high values in the peoples' spiritual and cultural development, and their psychological wellness.

Policy Objectives:

1. Safeguard the human rights of the disadvantaged and vulnerable populations, empower them, nurture them and provide for their social protection and development needs
2. Promote equitable and good quality health and education services
3. Promote workplace safety the safe use of private/public infrastructure/spaces
4. Implement a regulatory environment that promotes social wellbeing
5. Safeguard and Strengthen traditional social security, recreational and art activities and protection

How Climate Change Information is Used

Generally speaking, climate change information is used by GAD in response to specific policy or project related activities being carried out by the Department of Climate Change and Disaster (DCCD) or other agencies and civil society organisations. These include the development and review of the national climate change policy, and implementation of Tuvalu Integrated Vulnerability Assessment (TIVA), NAPA projects and post-disaster needs assessment for Tropical Cyclone Pam in 2015. The use of climate change information (i.e. climate change vulnerability and meteorological data) can also be opportunistic to take advantage of available funding on gender equality and women's empowerment that has a focus on climate change and disaster risk reduction. For example, GAD used information on Tuvalu's vulnerability to climate change to apply for funding from UN Women to run a mock parliament for women in 2016. GAD was successful in obtaining the funding and as part of the mock parliament, women debated on the merits of introducing a Climate Change Education Bill. The information used by GAD is largely qualitative, such as reports from past or current adaptation and mitigation projects being implemented in Tuvalu.

Information and updates on climate change activities from National Advisory Committee on Climate Change are used by GAD to inform their policy and programming work, and shared in community consultations and workshops, and in GAD's quarterly newsletter. It has been noted by GAD staff that climate change information involves technical language which needs to be translated and presented in the local language, especially for a community audience.

How Gender and Social Information is Used within Climate Change Activities

Gender mainstreaming is the approach used by GAD to incorporate gender considerations into climate change planning and decision making. GAD representation on the National Advisory Committee on Climate Change is one example of how gender issues are being mainstreamed. GAD officers attending the National Advisory Committee advocate for the specific needs of women, girls and vulnerable groups and raise awareness on issues such as violence against women and women's roles in food security and nutrition, informal income generation activities (i.e. handicrafts) and household resource management, and how these issues are exacerbated by climate change and environmental pressures. They also advocate for greater inclusion of women in decision making for climate change projects. GAD uses the National Advisory Committee on Climate Change as a platform to make suggestions on opportunities for enhancing adaptive capacity of women, men and other societal groups by being cognisant of their abilities, skills and roles they play at home and in the community.

In the absence of recent research and routine evaluation on gender impacts of climate change, GAD staff use their own knowledge and experience, and past studies of gender roles and responsibilities to contribute to adaptation planning processes (see Box 17). GAD staff provide gender sensitisation training to educate men and women on the importance of equality in building long term community resilience to climate change and other development challenges. GAD provides input and support to other departments and sectors that request assistance on gender issues.

As discussed in the NAP and Coastal Management case studies, social and demographic information is being used for climate change vulnerability assessments. Examples include the collection and analysis of qualitative data by DCCD for TIVA to understand vulnerabilities and adaptation priorities for men, women and youth on all islands. Socio-economic baselines are also being compiled by the Tuvalu Coastal Adaptation Project (TCAP) for the islands of Funafuti, Nanumea and Nanumaga to inform the design and construction of coastal protection measures and for assessing and monitoring related social and gender impacts. The use of gender and social information is prompted by a specific purpose more so than being a standardised practice within DCCD.

Box 17. NAPA I Study on Gender Roles and Time Use Patterns⁹¹

The NAPA I Project undertook a gender time use study in Funafuti, Niutao and Nanumea. The objective of the study was to examine how men and women spent their time during a typical day. The study showed gender differences: women spend significantly more time cooking, washing and cleaning (an average of 3 hours and 42 minutes) compared to men who spend an average of 47 minutes on these tasks. Women spend slightly more time in caring for children, the elderly and sick relatives than men whilst men spend more time home gardening and feeding pigs and poultry than women. This information was used to understand how men and women use resources that are affected by climate change and to recommend improvements in the design and delivery of NAPA I activities to address gender differentiated needs. For instance, it was recommended for women to be involved in deciding where new water tanks provided through the project will be located as the time use study showed that women spend more time than in undertaking domestic chores that require water usage (e.g. cooking, cleaning and washing).

⁹¹ Sourced from Bernard, K. (2013). 'How men and women use their time in Tuvalu: A time use study'. *SPC Women in Fisheries Information Bulletin*. No 23. Available at https://spccfpstore1.blob.core.windows.net/digitallibrary-docs/files/3c/3c8591f038e248b90b4b5910939197d7.pdf?sv=2015-12-11&sr=b&sig=g7cJGxxmhoSiMfbEp6u%2BOYHxmrJcflqHjZzDuQROEk%3D&se=2020-01-20T05%3A15%3A37Z&sp=r&rsc=public%2C%20max-age%3D864000%2C%20max-stale%3D86400&rsct=application%2Fpdf&rscd=inline%3B%20filename%3D%22WIF23_30_Bernard.pdf%22

Information Types and Sources

Age and sex disaggregated data is collected by GAD and DCCD only at an activity or project-based level. The data collected is predominantly associated with attendance and participation, such as the number of men and women involved in consultations or training. GAD and DCCD use these statistics for project reporting, sometimes as a requirement from donor partners.

Demographic data from the Statistics Department is used by GAD as a free and reliable source of age and sex disaggregated information on national and island population. Data and qualitative information on people with disabilities in Tuvalu is available from the Tuvalu Study on People with Disability (2018), funded by Pacific Women.⁹² Other types of data used by GAD are presented in Table 15. Demographic data is most commonly used, with other data used when required for specific activities or projects. Only the GAD Director uses external sources of climate change information for general knowledge and research.

From time to time, GAD engages in primary data collection if there is need for certain data. For instance, after TC Pam in 2015, GAD conducted a post-disaster needs assessment by administering a community survey and conducting interviews with men and women in the affected communities. The assessment captured the number of people displaced on each island, their immediate needs for assistance, and their satisfaction on household food relief, which were all disaggregated by sex. The survey data together with qualitative data was presented in a report, which was made available to the National Disaster Committee and key humanitarian agencies.

Table 15. Data Categories and Information Sources used by GAD

Categories of Data Used		
Agriculture	Education	Health
Demographic (age, sex, population and households)	Employment & Income	Property and infrastructure
Disability	Energy and Emissions	Protection (child and family, domestic violence)
Climate Change Information External Sources Used		
IPCC	SPREP	UNFCCC
SPC	USP	

Current Challenges

The Post-Tropical Cyclone Pam, Gender Needs Assessment Report (2015) highlighted that GAD and the Government of Tuvalu were unprepared and unorganised to collect the information needed for a thorough and fully costed post disaster needs assessment. The report identified the lack of data collection, compilation, monitoring and evaluation systems in place within GAD and government more generally, and there were no measurable indicators on gender and disaster response. These issues are still current and need to be addressed.

Informants reported that a lack of data and research on key issues such as gender-based violence is a major constraint to the work of GAD. Without hard data or evidence-based research, GAD relies on census data and anecdotal information to inform its policy planning and service delivery. Action-research on priority topics, including climate change, is needed by GAD to develop tailored programs for different groups. This need has been echoed by DCCD as they require more relevant gender and social information for the NAP process.

GAD does not have a central database to store gender statistics or information collected from their activities and projects. Consequently, data and information remain in original files and documents, which are stored on individual laptops and computers. There is also a need to promote information sharing within government to facilitate discoverability and application of data and information produced by different departments and projects.

⁹² The study report is available from <https://pacificwomen.org/wp-content/uploads/2018/08/Tuvalu-Study-on-People-With-Disability-Full-Report-July-2018.pdf>

DCCD has received relevant reports from GAD in the past however they found it difficult to extract the data they were looking for as it was weaved into the narrative text. DCCD would like to see more standalone and generic data products from GAD that can be used for NAP formulation and other applications for climate change planning.

Existing Good Practice and Future Opportunities

GAD considers climate change as an opportunity for educating both men and women about the contributions they make in adapting to climate change impacts and in reducing greenhouse gas emissions. There is scope for GAD and DCCD to join forces to enhance community awareness on climate change and to design tailored activities that recognise the different adaptation needs of men and women for inclusion into the NAP. GAD's focus on community development, not just gender, would be beneficial in the NAP process to ensure other societal groups are involved and their needs considered.

There is willingness from GAD to improve information gathering and dissemination to better inform adaptation planning and decision making. Climate change is considered a very important issue for GAD and they would like to enhance the technical capacity of GAD staff in undertaking gender analysis of climate change projects. The NAP process is an opportunity for technical staff from GAD and DCCD, as well as DCA to share data and information, exchange knowledge and experiences, and benefit from peer-learning and support in integrating gender and social considerations into national adaptation planning. Ensuring the NAP process is gender-sensitive is not a responsibility of one agency but an imperative for all stakeholders to consciously identify and assess gender and social issues.

Summary

There is common understanding within national government about the importance of gender equality and social inclusion in reducing vulnerability and strengthening people's adaptive capacity to climate change. There are organisational and technical challenges that must be overcome to allow greater sharing, use and reuse of gender and social information. For NAP and development planning more broadly, it is necessary to move away from activity and project-specific data collection and analysis within GAD, to a systematic process of gathering, measuring and reporting on gender and social indicators across all sectors of Tuvalu.

ANNEX 1: LIST OF PARTICIPATING ORGANISATIONS

The organisations that participated in the situation analysis are listed below.

SPREP

- Climate Change Resilience Programme
- Environmental Monitoring and Governance Programme
- Human Resources Department
- Senior Management

Papua New Guinea

- Climate Change and Development Authority
- Department of Personnel Management
- Department of Works
- National Weather Service
- Office for the Development of Women

Tonga

- Department of Climate Change
- Women's Affairs Department
- Local Government Division

Tuvalu

- Department of Climate Change and Disaster
- Gender Affairs Department
- Office of the Prime Minister

ANNEX 2: INTERVIEW AND SURVEY QUESTIONS

INTERVIEW QUESTIONS

1. What are the main drivers of gender and social inclusion/national adaptation planning/coastal management/infrastructure decisions made in your organisation [select suitable sector for the interviewee]?
2. What overall objectives are the decisions seeking to achieve?
3. Who makes these decisions?
4. Where does the need to make the decision usually come from?
5. What is your organisation's involvement in national adaptation planning?
6. What is your role in national adaptation planning?
7. What information is utilised for the national adaptation planning process?
 - a. What type of information?
 - b. What is the information source?
 - c. Is the information up-to-date? Reliable? Accessible? Free?
 - d. Does it meet your needs?
8. Who are the key stakeholders of national adaptation planning process? How are they consulted or engaged?
9. What information, methods and tools, do you or will you use for adaptation planning?
10. In your opinion, what makes climate change information useful and usable?
11. Do you have examples of climate change information you find useful?
12. From past experience, have any of your/your organisation's decisions resulted in maladaptation? Or decisions that increase climate vulnerability?
13. In your opinion, what makes a 'good' adaptation decision?

SURVEY QUESTIONS

1. What is your position title?
2. What is your highest level of qualification?
3. What is your education or training background?
4. Who do you report to?
5. What is the decision-making culture of your organisation?
6. How important is climate change to your/your organisation's decisions?
7. How do you use climate change information in your role?
8. What type of information do you or have you used in your role?
9. What sources/repositories of climate change information are you using or have you used in your role?
10. Does climate change information influence the decisions you make?
11. Are there any challenges or opportunities with access, collection, analysis and interpretation, storage, dissemination, application, accuracy and reliability and timeliness aspects of climate change information?
12. Are you or have you been involved in adaptation planning?
13. What is your role in climate change adaptation?
14. What stage of the national adaptation planning process is your organisation at, involved in or is supporting currently?
15. Please provide a specific example of how you use climate change information for adaptation planning or decision making.

ANNEX 3: REFERENCES

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