



# National Framework for Weather, Climate and Ocean Services for Niue 2023 - 2028



Stakeholder Workshop, Alofi Niue, 24 – 25 May 2023 (Source: Broadcasting Corporation of Niue)

November 2023



The development of National Framework for Weather, Climate and Ocean Services for Niue was supported by Enhancing Climate Information and Knowledge Services for resilience in the 5 island countries of the Pacific Ocean', referred to as UNEP CIS-Pac5, is a USD49.9 million programme, led by the United Nations Environment Programme (UNEP) and funded by the Green Climate Fund (GCF), to establish integrated climate and ocean information systems and multi-hazard early warning systems in Cook Islands, Niue, Palau, Republic of Marshall Islands and Tuvalu".

## CONTENTS

<b>ACRONYMS</b> .....	<b>4</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>7</b>
<b>1 INTRODUCTION AND BACKGROUND</b> .....	<b>9</b>
1.1 Introduction.....	9
1.1.1 Purpose of the NFWCOS.....	10
1.1.2 Strategic planning methodology.....	10
1.2 Background.....	13
1.2.1 Organizational history.....	13
1.2.2 Organisational Structure.....	13
1.2.3 Key Achievements.....	17
<b>2 ENVIRONMENTAL SCAN</b> .....	<b>19</b>
2.1 Strengths, weaknesses, opportunities, and threats analysis.....	20
2.1.1 Strengths.....	20
2.1.2 Weaknesses.....	20
2.1.3 Opportunities.....	21
2.1.4 Threats.....	21
2.2 Political, economic, sociocultural, technological, legal, and environmental analysis.....	23
2.3 National stakeholder consultation and baseline analysis.....	24
2.3.1 Key Stakeholders.....	26
2.4 Conclusions from the environmental scan.....	29
<b>3 VISION, MISSION, AND PURPOSE FOR THE NIUE METEOROLOGICAL SERVICES</b> .....	<b>30</b>
3.1 Vision.....	30
3.2 Mission.....	30
3.3 Purpose.....	30
<b>4 GOALS, OBJECTIVES, AND STRATEGIES FOR THE NATIONAL FRAMEWORK FOR WEATHER, WATER, CLIMATE AND OCEAN SERVICES FOR NIUE</b> .....	<b>30</b>
4.1 Goals, Objectives and Strategies.....	31
<b>5 GOVERNANCE STRUCTURES</b> .....	<b>34</b>
5.1 Governance structures for the NFWCOS.....	34
<b>6 SUPPORT PROGRAMMES</b> .....	<b>35</b>
6.1 Stakeholder coordination.....	35
6.2 Communication programmes.....	35
<b>7 DEVELOPING A NATIONAL IMPLEMENTATION / ACTION PLAN</b> .....	<b>35</b>
7.1 Risk Assessment and Mitigation Measures.....	43
<b>8 FINANCING THE STRATEGIC PLAN</b> .....	<b>45</b>
<b>9 MONITORING, EVALUATION, AND REPORTING</b> .....	<b>45</b>
9.1 Monitoring.....	45
9.2 Evaluation.....	48
9.3 Reporting.....	48
<b>ANNEXES</b> .....	<b>48</b>

## Acronyms

ADB	Asia Development Bank
APCC	APEC Climate Center
AWS	Automatic Weather Stations
AWOS	Automated Weather Observing System (for aviation)
BCN	Broadcasting Corporation of Niue
The Bureau	Australian Bureau of Meteorology
CBO	Church Based Organisation
CCAP	Climate Change Action Plan
CIS-Pac5	Enhancing Climate Information and Knowledge Services for resilience in the 5 island countries of the Pacific Ocean
CLiDE	Climate Data for the Environment
COSPPac	Climate and Oceans Support Program in the Pacific
CREWS	Climate Risks and Early Warning Systems
CROP	Council of Regional Organisations of the Pacific
CSIRO	The Commonwealth Scientific and Industrial Research Organisation
CSO	Civil Society Organization
DAFF	Department of Agriculture, Forestry and Fisheries
DFAT	Department of Foreign Affairs and Trade
DRR	Disaster Risk Reduction
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
FAD	Fish Aggregating Device
FBO	Faith Based Organisation
FMS	Fiji Meteorological Services
GA	Geoscience Australia
GCF	Green Climate Fund
GCOS	Global Climate Observing System
GDP	Gross Domestic Product
GEOSS	Global Earth Observation System of Systems
GFCS	Global Framework for Climate Services
GNSS	Global Navigation Satellite System
GPC	Global Producing Centre

GTS	Global Telecommunication System
ICAO	International Civil Aviation Organization
ICT	Information and Communication Technology
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
JNAP	Joint National Action Plan
Met Act	Meteorological Act
MFAT	Ministry of Foreign Affairs and Trade
MHEWS	Multi-Hazard Early Warning Systems
MNR	Ministry of Natural Resources
NCC	National Coordinating Committee
NCOF	National Climate Outlook Forum
NDMO	National Disaster Management Office
NFCS	National Framework for Climate Services
NFWCOS	National Framework for Weather, Climate and Ocean Services
NGO	Non-Government Organization
NIFA	Niue Island Fishing Association
NIOFA	Niue Island Organic Farmers Association
NIWA	National Institute of Water & Atmospheric Research
NMHS	National Meteorological Hydrological Service
NMS	Niue Meteorological Service
NNSP	Niue National Strategic Plan
NZMet	New Zealand Meteorological Service
OCOFC	Ocean Climate Outlook Forum
PESTLE	Political, economic, sociocultural, technological, legal, and environmental analysis
PICOF	Pacific Islands Climate Outlook Forum
PICS	The Pacific Islands Climate Services (PICS) Panel
PICTs	Pacific Island Countries and Territories
PIETR	The Pacific Islands Education, Training and Research (PIETR) Panel
PIFS	Pacific Islands Forum Secretariat
PIMOS	The Pacific Islands Marine and Ocean Services (PIMOS) Panel

PIMS	Pacific Islands Meteorological Strategy
PKO	PIMS Pacific Key Outcomes
PMC	Pacific Meteorological Council
PMCU	Project Management and Coordination Unit
PRSCS	Pacific Roadmap for Strengthened Climate Services
QMS	Quality Management System
RA V	WMO Regional Association V
RCC	Regional Climate Centre
RMAC	Resource Management Advisory Committee
RSMC	Regional Specialized Meteorological Centre
RSO	Research, Systematic Observation
SATAID	Satellite Animation and Interactive Diagnosis
SNC	Second National Communication
SPC	Secretariat for the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
SWOT	Strengths, Weaknesses, Opportunities and Threats
TB	Treasury Department
TC	Tropical Cyclone
TK	Traditional Knowledge
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations Office for Disaster Risk Reduction
USP	University of South Pacific
WHO	World Health Organisation
WMO	World Meteorological Organization
WMO RAV	World Meteorological Organization Regional Association Five
WWW	World Weather Watch
WWCDC	Weather Warning, Climate and Disaster Communication

## Executive summary

### Country Profile

Niue, situated in the Southwest Pacific Ocean, is a self-governing state in free association with New Zealand, an arrangement dating from October 1974. “Niue’s constitutional relationship with New Zealand is one where the external affairs and defence of Niue is the responsibility of New Zealand. Up until 1988, treaty action for and on behalf of Niue was undertaken by the Government of New Zealand. Niue is now responsible for its own treaty action”<sup>1</sup>. Niueans are New Zealand citizens and almost 90 per cent of Niue's population lives in New Zealand.

Niue has a land area of 259 km within its exclusive economic zone of 39,000 km<sup>2</sup>. “Niue is one of the largest raised coral atolls in the world, with no mountains or rivers, little arable land and limited natural fresh water supplies. It is a single island, with two distinct levels: a plateau in the centre of the island reaches about 60m above sea level and is surrounded by limestone cliffs. An estimated 70% of the plateau is covered by forest.<sup>442</sup> The lower level is a coastal terrace about half a kilometre wide and about 25m high, sloping down to meet the sea at small cliffs with many limestone caves. Its surrounding reef has a single navigable break near the capital, Alofi.

Niue has no surface water, but a deep freshwater lens. It has shallow soils, that support extensive forests and shifting cultivation, and a narrow fringing reef.

Its marine region hosts several seamounts renowned for their high value fisheries productivity. Niue’s lack of fresh water and its remoteness mean its resilience to natural disasters is very low. In 2010 Niue was listed as the second most vulnerable country in the Asia-Pacific region, based on relative physical exposure to storms and impacts on its population, and third top in the potential loss to its GDP<sup>2</sup>. The Government's financial resources are derived from taxation, government trading activities, sovereign assets and development partners.

Its population of approximately 1600<sup>3</sup> (July 2023 estimate) is spread across 14 villages. Large scale outward migration, usually from younger age groups, has occurred since 1971, predominantly to New Zealand for education, employment opportunities and family ties, as well as perceived higher standards of living abroad. About 24,000 people of Niuean ancestry live in New Zealand.

The economy is heavily dependent on support from New Zealand, which has a statutory obligation to provide economic and administrative assistance to Niue. Aid accounts for 70% of Niue’s GDP. Other financial resources include agricultural exports, taxation, fishing licences, international lease of Niue’s unique four-digit phone numbers, remittances from Niueans working abroad and additional support from development partners. Its low population, scarcity of natural resources, isolation and high costs of transportation mean that Niue’s economy is not yet self-sufficient.” – CIS-Pac5 Feasibility Study

Niue has a tropical maritime climate and two distinct seasons—a warm wet season from November to May and a cooler dry season from June to October. Its annual average temperature is 24°C and its average annual rainfall is 2052mm. Niue tends to experience warm temperatures all year around with average of 21°C to 25°C in dry season and 24°C to 29°C in wet season.

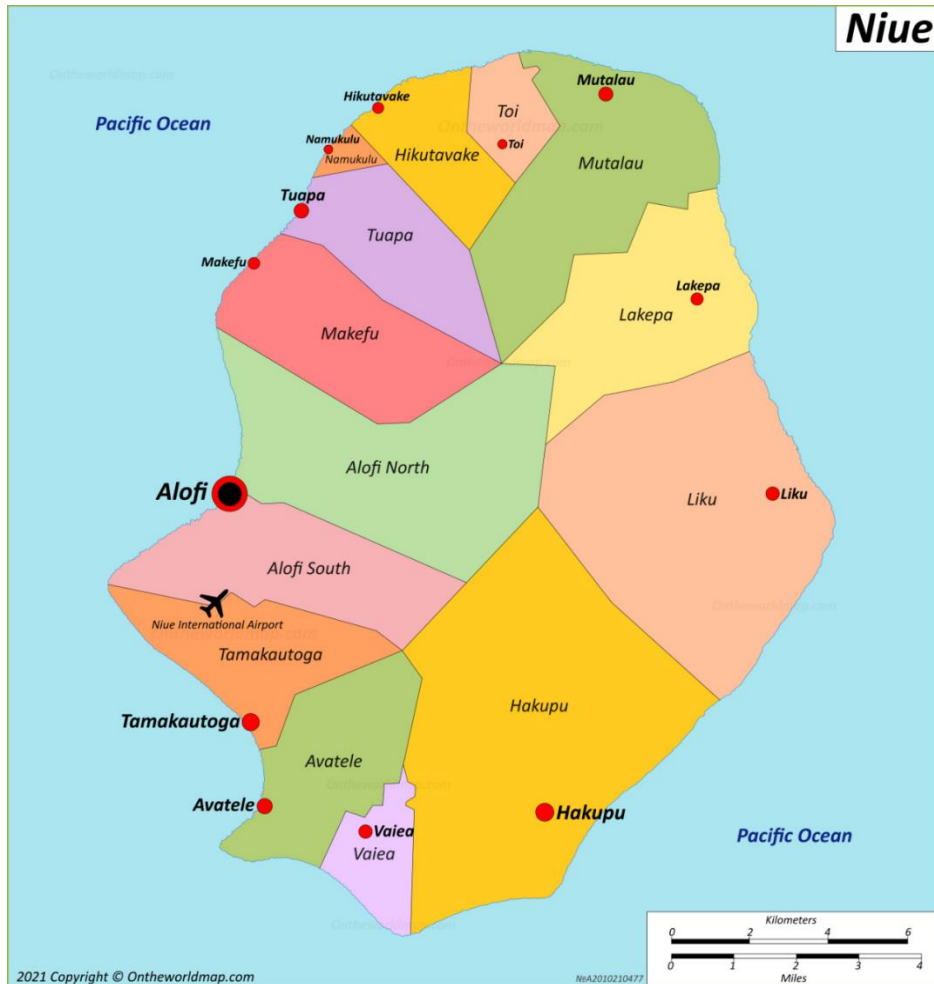
Due to Niue’s location at the edge of the southern tropical cyclone belt and within the zone of the influence of southeast trade winds, makes it susceptible to tropical cyclones. Niue has experienced an average of ten tropical cyclones per decade.

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<sup>1</sup>Niue Second National Communication under the United Nations Framework Convention on Climate Change - 2014

<sup>2</sup> 1998–2009 study conducted by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and the United Nations Office for Disaster Risk Reduction (UNISDR) (2010)

<sup>3</sup> <https://www.worldometers.info/world-population/niue-population/>



**Figure 1: Map of Niue (Source: <https://ontheworldmap.com/niue/>)**

## Overview

The National Framework for Weather, Climate and Ocean Services (NFWCOS) for Niue provides a strategic direction and appropriate actions for the Niue Meteorological Services (NMS) to achieve its vision and mission to provide quality and reliable weather, water, climate and ocean services in next 5 years. NFWCOS is aligned with the priorities highlighted in the Corporate Plan 2020-2025 for the Niue Meteorological Services (NMS):

1. Maintain core services:
  - Credible timely and accurate dissemination of weather warnings and climate information and services.
2. Weather, Climate & Climate Change Outreach:
  - Education and awareness at all levels
3. Stakeholder engagement:
  - Climate applications across sectors

## Vision

The Vision for NMS is “A prime driver of weather and climate services.”

## Mission

The Mission for NMS is “To provide credible and timely weather and climate services for all stakeholders.”



## **NFWCOS Goals and Objectives**

The intention of the Goals and the Objectives for NFWCOS are to enable NMS to achieve its departmental vision and mission. Niue's NFWCOS' goals and objectives aim to achieve all or most of the Priority Key Outcomes (PKO) of the Pacific Islands Meteorological Strategy (PIMS) 2017 – 2027.

**Goal 1:** Strengthen Niue Meteorological Services' ability and infrastructure to provide improved, robust and undisrupted national weather, climate including climate change and ocean services and warnings to meet national to community level user needs.

**Objective 1.1:** Improve institutional and human resources capacity development.

**Objective 1.2:** Enhance NMS' national weather, climate including climate change and ocean products and services to meet national to community level user needs.

**Goal 2:** Strengthen Niue Meteorological Services' partnership and coordination with the ministries and departments, national sectoral agencies, private sectors and communities to improve service delivery, increase the effectiveness and proper use of meteorological, ocean, climate products and services.

**Objective 2.1:** Establish an on-going two-way communication platform between NMS and users of weather, climate and ocean products and services.

**Objective 2.2:** Enhance and formalise NMS' partnership with key government and sectoral agencies.

**Objective 2.3:** Establish forecast-based financing system for Niue in partnership with the Treasury Department to implement mitigation measures in response to severe weather and climate warnings.

**Goal 3:** Enhance understanding and usage of weather, climate including climate change and ocean products and services and warnings by key stakeholders including government, private sectors, FBOs, CSOs, NGOs and village communities.

**Objective 3.1:** Conduct comprehensive awareness and outreach programme for all stakeholders on understanding and usage of weather, climate including climate change and ocean products and services and warnings.

**Objective 3.2:** Integrate traditional knowledge into climate and ocean information services to better communicate NMS' products.

**Goal 4:** Improve and maintain the meteorological, climate and ocean observation network and data collection across Niue.

**Objective 4.1:** Enhance and maintain national weather, climate and ocean observations and monitoring networks.

**Objective 4.2:** Enhance and maintain meteorological and climate database for Niue.

## **1 Introduction and background**

### **1.1 Introduction**

The NFWCOS recognises the functions and responsibilities for NMS in the Meteorological Act 2013. The Act states NMS as the only authoritative provider of meteorological and climate information for Niue. Based on the current status of NMS and their key stakeholders, and their needs and requirements, NFWCOS has derived an Action Plan in order to establish an adequate and effective weather, climate and ocean services for Niue.

### **1.1.1 Purpose of the NFWCOS**

In order to guide effective development and applications of climate services around the world, the Global Framework for Climate Services (GFCS) was established in 2009 at the World Climate Conference-3 organised by the World Meteorological Organisation (WMO) with other United Nations (UN) agencies, governments and partners. The vision of the GFCS is to enable society to better manage the risks and opportunities arising from climate variability and change, especially for those who are most vulnerable to such risks. It does this through the development and incorporation of science-based climate information and prediction into planning, policy and practice.

Effective implementation of the GFCS should improve the quality, consistency and application of climate services in Niue and will help manage the risks and opportunities arising from climate variability and change. GFCS implementation is achieved by strengthening national observation networks, information management systems, and improving national capabilities for climate services development and applications. GFCS also supports focused climate stakeholder interaction, and capacity building at the national, regional and global levels.

The 4th Pacific Meteorological Council (PMC) and the Second Pacific Ministerial Meeting on Meteorology at their meetings in July 2017 adopted the Pacific Roadmap for Strengthened Climate Services (PRSCS). The PRSCS prioritises key actions for the implementation of the GFCS in the Pacific.

In May 2022, WMO updated and revised the step-by-step guidelines for establishing a framework which now includes weather and water services. “Such a national framework aims to coordinate institutions and enable them to work together across the value chain to co-design, co-produce, communicate, deliver, and use weather, water, and climate services for decision-making in sensitive sectors. The value chain encompasses the production and delivery of weather, water, and climate services (i.e., from observations, modelling, forecasting, co-design, and service delivery), as well as stakeholder actions and outcomes, and involves the routine evaluation of associated costs and benefits. The NFWCS are being developed as an update, based on experiences with the development and implementation of the National Framework for Climate Services (NFCS), to cover weather, water, and climate services, which are the full mandate of the World Meteorological Organization (WMO)”. NFWCS is also well aligned with the Pacific Islands Meteorological Strategy (PIMS) 2017 – 2027 Key Outcomes:

- Improved Weather Services
- Disaster Risk Reduction
- Improved Climate and Hydrological Services
- Integrated Observing and Communication Systems
- Coordinated Support for NMHSs and PMC

The purpose of the NFWCOS for Niue is to provide a strategic direction and appropriate actions for the Niue Meteorological Services (NMS) and other key national stakeholders to improve weather, water, climate and ocean services in Niue for the next 5 years. Based on the current services provided by the NMS, the Framework outlines the action plan to support the capacity development to address identified gaps and needs.

### **1.1.2 Strategic planning methodology**

The development of the NFWCOS was guided by the WMO Integrated Strategic Planning Handbook (WMO, 2016), and the WMO Step-by-step Guidelines for Establishing a National Framework for Weather, Water, Climate and Ocean Services (2022). Noting that ocean services is an emerging function of the NMS, it has been included in the framework. An independent climate consultant was contracted by UNEP to assist with the planning, consultation and preparing of the Framework.

The development of the NFWCOS has been informed by the Meteorological Services Act 2022 (refer to Section 1.2.2), and the following national documents were considered:

### 1. Niue National Strategic Plan (NNSP) 2016 – 2026

NNSP is a high-level roadmap setting out the Niue Government's direction and priorities for Niue to act at all levels to reach its vision for a prosperous Niue. NNSP has seven national development pillars:

- I. Finance and Economic Development (Sufficient financial resources are secured, and responsible fiscal management is prudent, sustainable and in support of development strategies)
- II. Governance
- III. Social Services
- IV. Environment and Climate Change which emphasises (sustainable use and management of Niue's natural resources and environment for present and future generations).
- V. Tāoga Niue (cultural heritage)
- VI. Private Sector

NMS supports the Environment and Climate Change pillar in the NNSP. The provision of weather and climate information contributes to the enhancement of Economic Development, Governance, Infrastructure, Social Services, Tāoga Niue and Private Sector.

PILLARS	Function A: Meteorology	Function B: Climatology	Function C: Finance
Financial & Economic Development	√√	√√	√√
Governance	√√	√√	√√
Infrastructure	√√	√	√√
Social Services	√√	√√	√√
Environment & Climate Change	√√√	√√√	√√√
Tāoga Niue	√	√√	√
Private Sector	√	√	√

**Figure 2: Table aligning NMS activities with the NNSP Pillars (source: Corporate Plan 2020-2025)**

### 2. Niue Second National Communication under the United Nations Framework Convention on Climate Change (UNFCCC) – 2014

In order to fulfil its obligations under the UNFCCC, the Government of Niue prepared the Second National Communication (SNC).

It outlines that NMS serves the purpose to promote Research, Systematic Observation (RSO) for furthering understanding and reducing the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change. It further outlines the Article 6 of UNFCCC which requires parties to the convention to achieve the following, to which NMS can contribute to but not limited to:

- I. Promote and facilitate at the national and, as appropriate, sub regional levels, and in accordance with national laws and regulations, and within their respective capacities:
  - a. The development of implementation of educational and public awareness programmes on climate change and its effect;
  - b. Public access to information on climate change and its effects;

- c. Public participation in addressing climate change and its effects and developing adequate responses; and
  - d. Training of scientific, technical and managerial personnel.
- II. Cooperate in and promote, at the international level, and, where appropriate, using existing bodies:
    - a. the development and exchange of educational and public awareness material on climate change and its effects; and
    - b. the development and implementation of education and training programmes, including the strengthening of national institutions and the exchange or secondment of personnel to train experts in this field, in particular for developing countries.

### **3. Niue's Joint National Action Plan for Disaster Risk Management and Climate Change – April 2012**

Niue's JNAP, which is currently being reviewed, identified five priority areas of attention which can be relevant to NFWCOS.

- I. Strong and effective institutional basis for disaster risk reduction/climate change adaptation.
- II. Strong public awareness and improved understanding of the causes and effects of climate change, climate variability and disasters.
- III. Strengthened livelihoods, community resilience, natural resources and assets.
- IV. Strengthened capacity to adapt renewable energy technologies and improve energy efficiency.
- V. Strengthened disaster preparedness for effective response.

### **4. Niue Sustainable Coastal Development Policy – April 2008**

Based on lessons learnt from disasters such as those caused by cyclones Ofa and Heta and to ensure consistency with existing legislation and resource management plans (e.g., the Integrated Coastal Management Plan for Agriculture, Forestry and Fisheries); the scope of this policy covers all coastal areas of Niue.

One of the principles the policy is based on is: "Coastal management and development efforts should adopt a risk reduction and risk management precautionary approach under conditions of uncertainty with regard to impacts' consequences of climate change (prolonged drought periods, sea-level rise, increased intensity and frequency of cyclones and changing rainfall patterns)."

Goal 6: "Disaster risk reduction and disaster management."

Relevant action strategies identified where NMS can directly contribute:

Objective 5.1 To plan and manage coastal development so as to reduce risk and exposure of people, property and economic activities to significant risk from dynamic coastal processes:

- Assess and strengthen the capacity of the early warning systems to provide accurate and timely warning to the community.
- Enhance public/community awareness and education on coastal risks and early warning.
- Promote and strengthen community-based disaster management through appropriate training of village councils, NGOs and community groups in disaster preparedness, response and recovery.

Objective 5.2 To take into consideration the potential and known consequences of climate change and associated sea- level rise in all coastal planning, management and development:

- Appropriate mitigating and adaptive measures to address the consequences of sea-level rise, droughts and storm surges on the coastal resources should be included in the priorities of climate change programmes.
- Strengthen appropriate public education and awareness programmes relating to the impacts of climate change on coastal areas and resources.

Pre and post workshop desktop analysis and an in-country consultation workshop was held in Niue on 24<sup>th</sup> to 25<sup>th</sup> May 2023 in order to: 1) identify the gaps and needs weather, climate and ocean services in Niue; identify and confirm appropriate mechanisms to improve and sustain the flow, co-production, and delivery of user-salient climate information for different users; derive identify action plan for NFWCOS implementation, focusing on areas for joint action (refer to Annex 1 for the workshop report). The goals and objectives for the NFWCOS were discussed and agreed with the NMS before the drafting of the document.

## 1.2 Background

### 1.2.1 Organizational history

“Meteorological operations were managed under the Telecom Department since its first climate records in 1905. Two climate stations and two rainfall stations were installed during this period with minor site changes since. NMS was established in 1996 and became operational in 1997. Currently, based at Hanan Airport the Department is the reference station undertaking all weather and climate observations and services. There are no upper air observations carried out in Niue. The Department’s mission is to provide efficient weather and climate information. Its core business includes the issuing of reliable weather and marine forecasts and warnings; reporting meteorology and climatological observations; advising on threat of tropical cyclones and other natural disasters; and fulfilling commitments and obligations with inter-governmental organisations.”<sup>4</sup> Currently NMS is under the Ministry of Natural Resources which also includes the Department of Agriculture, Forestry and Fisheries (DAFF) and Environment Department.

The Regional Specialized Meteorological Centre (RSMC), Nadi, Fiji provides severe weather warnings, and public, aviation and marine forecasts. NMS translates and localise the weather forecast for the local community.

### 1.2.2 Organisational Structure

A Meteorology Bill, passed by the Fono Ekepule (Parliament) in 2013 encompasses all components relating to meteorology and therefore grant protection for the Department (NMS).

The purpose of the Niue Meteorological Service is to provide timely and reliable weather, climate and climate change information for the safety of life and property. Weather and climate services are fundamental for the sustainability of the environment, infrastructure and socio-economic development of Niue. Users such as mariners, farmers, road developers, builders, airlines and tourists depend on weather forecasts and warnings for better planning and decision-making.”<sup>5</sup>

NMS Vision: A prime driver of weather and climate services.

NMS Mission: To provide credible and timely weather and climate services for all stakeholders.

According to the Meteorological Act (Met Act), the functions for NMS in relation to meteorology and climate matters include the following:

- (a) the taking and recording of meteorological observations and other observations required for the purposes of meteorology:

<sup>4</sup> Niue Second National Communication under the United Nations Framework Convention on Climate Change - 2014

<sup>5</sup> Corporate Plan 2020-2025, Niue Meteorological Service

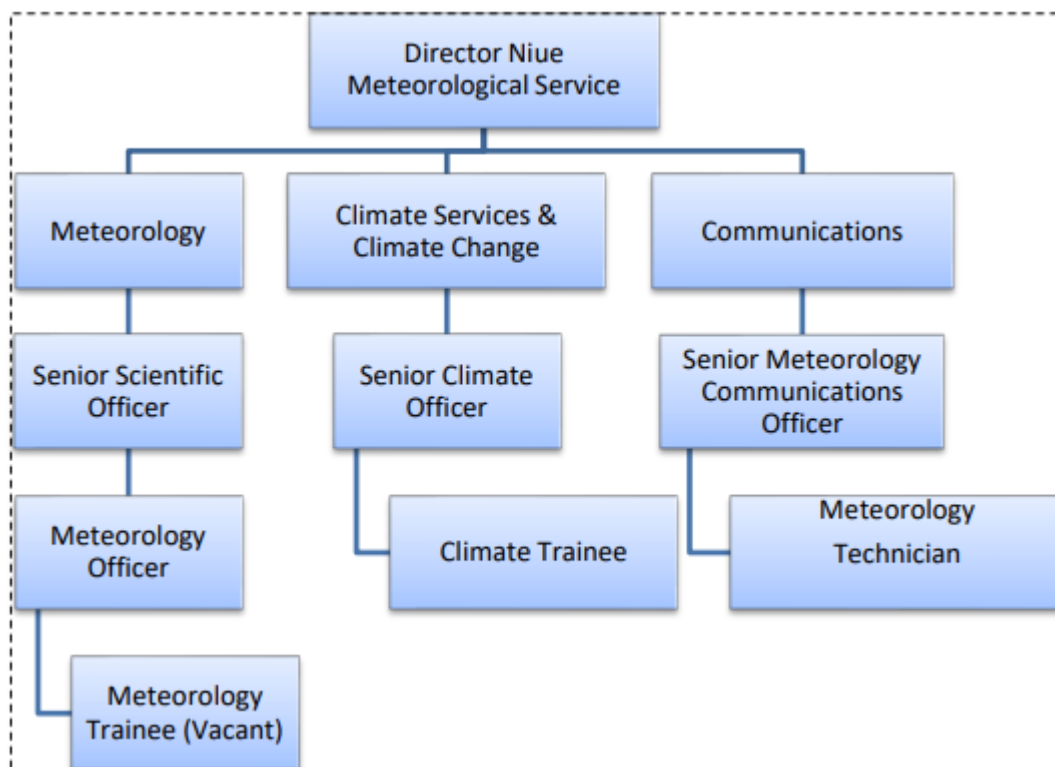
- (b) establishing and maintaining meteorology stations and other observation and research stations, and all other necessary technical installations and equipment:
- (c) forecasting weather, and monitoring the state of the atmosphere:
- (d) advising the government and its agencies on all matters relating to meteorology, and supporting the roles and responsibilities of the disaster management authorities in relation to disaster management response and risk reduction:
- (e) making arrangements to secure the safety and welfare of staff of the department who are performing their duties during times of disaster or potential disaster:
- (f) collecting, collating, archiving, and making available meteorological data and information in accordance with this Act, and developing an observations data strategy:
- (g) publishing meteorological reports, bulletins, advisories, and data:
- (h) promoting the effective use of meteorological information, and arranging for programs of public awareness and education:
- (i) promoting the advancement of meteorological science, by means of meteorological research, investigation, and by any other means:
- (j) providing general advice on meteorological and climate matters, and providing meteorological data and advice in support of specific national development projects and other important weather sensitive economic activities:
- (k) setting and applying standards for all observations used for aviation, maritime, and other general forecasts (and where such observations are used for legal purposes), and ensuring that all such standards conform to appropriate international specifications:
- (l) implementing policies international conventions, programmes, projects and initiatives in accordance with Part 3:
- (m) co-operating with the authorities administering the meteorological services of other countries, and with the World Meteorological Organisation, the International Civil Aviation Organisation, and any other relevant international organisations in relation to any of the functions and powers stated in this Part, and in particular, supporting the principle of free and unrestricted exchange of meteorological data between national meteorological services:
- (n) subject to government contracting procedures, entering into contracts or arrangements with any department, agency, or person in Niue or outside Niue to compile, record, or disseminate meteorological reports and information:
- (o) developing, facilitating, and providing training and instruction for persons whose duties and responsibilities concern matters relevant to meteorology or climate:
- (p) promoting the understanding and recognition of traditional practices and knowledge related to weather and climate through the observation of weather indicators occurring in nature, and by other means:
- (q) developing an effective communications strategy to ensure that advisories, bulletins, warnings, and alerts, and general meteorological information are broadcast and disseminated:
- (r) doing any other act which contributes to the capacities within Niue to provide effective and applicable meteorological and climate services, and to diminish the risks arising from adverse weather conditions.

The Met Act also states that NMS is responsible:

1. In consultation the Regional Specialised Meteorological Centre and other appropriate agencies, for issuing advisories, special weather bulletins, or warnings of strong winds, gales, storms, hurricanes, cyclones, and other weather conditions likely to endanger life or property

- (including weather conditions likely to give rise to floods or storm surges); and determining when any such warnings are to be downgraded or terminated.
2. For issuing alerts of tsunamis and the possible impacts of other geohazards when they are communicated to the department by regional monitoring agencies.
  3. For providing all necessary advice and assistance in accordance with the Niue National Disaster Plan, and if applicable, provide all necessary advice to the Disaster Management Council in relation to the issue of the appropriate Cyclone Alert.

NMS has three operational sections (Meteorology, Climate Services and Climate Change, and Communication).



**Figure 3: The Organisational Structure of Niue Meteorological Service**

Current Staffing

The current staff number is 7 including the Director, with 3 vacant positions.

**Table 1: Current Staffing at the Niue Meteorological Service**

Title/Staff Name	Incumbent
Director	Rossylynn Mitiepo
Communication Officer	Sean Tukutama
Meteorology Officer	Helen Tukutama
Meteorology Officer	Jedaiah Tukuitonga
Meteorology Technician	Floyd Viliamu
Climate Officer	Raquel Tanaki (New)
Traditional Knowledge Officer	Robert Togiamana

**Table 2: Number of Staff at NMS in last 10 years**

2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
7	7	7	8	10	9	8	7	8

## Observation Network

NMS' main observational office continues to be at the Hanan Airport, with two stations in Vaipapahi and Liku. The Automatic Weather Station (AWS) at the Hanan Airport will be upgraded to Automated Weather Observing System (AWOS) for aviation services by late 2023 to early 2024.

A Tide Gauge and a Global Navigation Satellite System (GPS) are also located at the Alofi Wharf. (This was affected by TC Tino, but currently it's under reconstruction and the hut is relocated but still within the wharf compound).

The climate data recorded are stored in a climate data management system called CliDE (Climate Data for the Environment) which ingests and archives digitised climate data and makes it available for manipulation and use in information products. The collection of local data allows the NMS to monitor and report on Niue's climate at local scale. CliDE has an inbuilt quality control process.

**Table 3: Niue Observation Network**

Station Name (WMO No.)	Operational Status	Equipment available at the site	Manual/Automatic (if manual, indicate the number of staff manning the station)	Gaps and Needs
91824 (Hanan Airport) Synoptic  J82400 (Climate station)	Active	Stevenson Screen, Wet & dry bulb thermometer, Max & min thermometer, manual rain gauges, digital barometer, evaporation pan, sunshine recorder, earth thermometer 30cm, ultrasonic wind speed and direction.	Manual 6 staffs Manual observations from 0800 – 1600 during working hours	
91825 (Hanan Airport) AWS	Active	Stevenson Screen, AWS system, Vaisala HMP155A, Automatic rain gauge, digital barometer, Vaisala ultrasonic wind speed and direction sensor, Met display, Tower display	Automatic Automatic Observations after hours and public holidays	Upgrade to full AWOS before end of this year or early next year. Ceilometer and visibility sensors to be added to the current system
Vaipapahi AWS	Active	Stevenson screen, AWS system, Digital Barometer, Automatic rain gauge, Air Temp sensors, Solar radiation sensor, Vaisala ultrasonic wind speed and direction sensor, soil moisture sensor, Earth thermometer sensors and Relative humidity sensors, satellite modem and antenna, 4g modem, Solar panel and 12 batteries	Automatic	
Liku AWS	Active	Stevenson screen, AWS system, Digital Barometer, Automatic rain gauge, Air Temp sensors, Solar radiation sensor, Vaisala ultrasonic wind	Automatic	



		speed and direction sensor, soil moisture sensor, Earth thermometer sensors and Relative humidity sensors, satellite modem and antenna, 4g modem, Solar panel and 12 batteries		
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### 1.2.3 Key Achievements

The NMS has the capabilities to issue:

- 3-day weather forecasts
- severe weather warnings
- strong winds warnings
- tsunami warning
- monthly climate summary (Annex 2)
- monthly climate outlooks (Annex 3)
- tropical cyclone warnings
- drought alerts
- coral bleaching alerts

#### Meteorological Programmes

- Surface observation: Climate observation at Hanan Airport includes rainfall, temperature, evaporation, sunshine hours, relative humidity, cloud cover, wind speed & direction. Three-hourly synoptic data for weather forecast and hourly data for aviation reports (METAR) are also recorded.
- These data are shared with collaborating partners in the World Meteorological Organization - World Weather Watch (WWW), the Global Climate Observing System (GCOS) and the Global Earth Observation System of Systems (GEOSS). Data generated is passed immediately to weather forecasting centres around the Pacific region and the world, via the Global Telecommunication System (GTS). These observations are also shared with regional agencies that attempt to predict how many tropical cyclones and severe tropical cyclones will develop within the Southern Pacific, such as the New Zealand's National Institute of Water & Atmospheric Research (NIWA), Meteorological Services of New Zealand (NZMet) and Fiji Meteorological Services (FMS).
- The NMS publishes 3-day weather bulletin (in English and Niuean), severe weather and tropical cyclone warnings when warranted. This information is made available to government key stakeholders, private sector and it is also posted on NMS Facebook and broadcasted by the Broadcasting Corporation of Niue (BCN) on local television. NMS provides slides on weather forecast, marine forecast, daily climate records (rainfall, rainfall in past 30 days, relative humidity, sunshine hours and air pressure) and tide forecasts to BCN.

#### Climate and Ocean Programmes and Projects

The NMS also hosts a number of scientific and research programmes:

- A state-of-the-art tidal gauge and Global Navigation Satellite System (GNSS) were officially launched in Alofi, on 5th November 2015. This sea-level monitoring infrastructure was funded by the Australian Government and implemented by the Climate and Ocean Support Program in the Pacific (COSPPac). The installation of the tide gauge and GNSS was conducted by the Australian Bureau of Meteorology (the Bureau) and the Geoscience Australia (GA) with support from the Pacific Community (SPC). Refer above comments on the reconstruction of the tide gauge is in progress for this year.

- NMS has run a climate information services for several years and plans to further extend to ocean information services. The NMS publishes monthly climate summary and monthly climate outlook.
- NMS participates in monthly Ocean Climate Outlook Forum (OCOF) which is a discussion among fifteen Pacific Island National Meteorological Services, SPREP, SPC, and the Australian Bureau of Meteorology.

### User Interface Platform

The NMS has never had a National Climate Outlook (NCOF) but they often run workshops on weather, climate, climate change traditional knowledge targeting villages and communities, this includes a pre-tropical cyclone season workshop in partnership with NDMO.

Furthermore, NMS also participates in the monthly Ocean Climate Outlook Forum hosted by SPREP and funded by COSPPac. OCOF is attended by climate officers from 15 Pacific Islands NMHSs and project partners (the Bureau, SPC and SPREP).

### Communication and Technology

**Table 4: Mode of Communication at NMS**

	Details
Mode of communication for transmitting data from remote stations	Primary - 4g network Secondary – satellite (Automatically switch to satellite if 4g network is down)
Mode of transmitting data to the Global Data Network	Data transmitted via email to Wellington to upload to GTS
Current Internet Speed (inbound and outbound)	Download – 31.47 Mbps Upload – 4.26 Mbps
Does your NMS have access to SATAID information	
Which satellite product do you most rely on and how do you obtain it?	Himawari – IR, IR (colorized), VIS Goes west - IR, IR (colorized), VIS ASCAT (METOP-B) NOAA Rely on Internet for satellite products

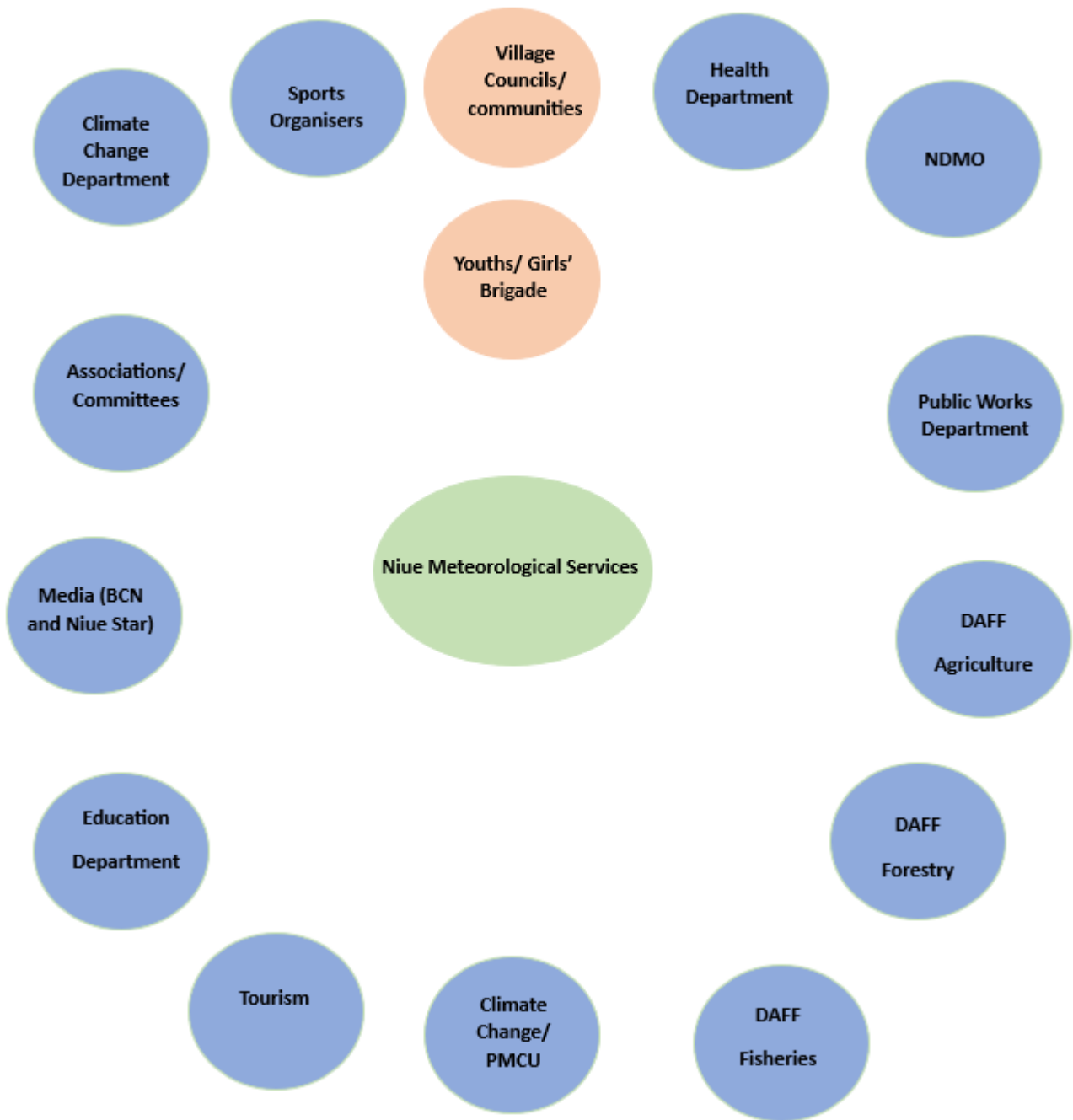
### Membership and Affiliations

NMS is a member of the United Nations Environment Programme, World Meteorological Organization, SPREP, and the Pacific Community (SPC). NMS is also a member of the Pacific Meteorological Council<sup>6</sup>. NMS has established a strong partnership or affiliation with several other global, regional and agencies.

### Public Sector Engagement and Partnerships

National government and other agencies have very good working and collaborative relationship with NMS, and there is a willingness to share resources and information amongst the agencies.

<sup>6</sup> The Pacific Meteorological Council (PMC): is a specialized subsidiary body of SPREP, established in July 2011 at the 14th Regional Meteorological Services Directors meeting in Majuro, Marshall Islands on a bi-annual basis to facilitate and coordinate the scientific and technical programme and activities of the Regional Meteorological Services.



**Figure 3: Niue Meteorological Services' Key National Stakeholders**

## 2 Environmental scan

In order to develop a meaningful strategic plan for the future, an accurate assessment of NMS' internal and external working environments has been carried out. The information was derived from statistics, progress reports, national plans and strategies, global and regional climate risk assessment reports and other relevant documents, and through consultation at the in-country workshop and follow-up discussions with NMS.

A recent report NextGen Projections for the Western Tropical Pacific: Current and Future Climate for Niue<sup>7</sup> highlighted increase in annual temperature and sea level by 2050 and 2050 based on high emission scenarios. “Following Cyclone Heta in 2004, the cost of recovery and reconstruction was almost NZ\$38million. Cyclone damage has risen due to extreme winds and rainfall, coupled with sea level rise, destructive waves, storm surges and coastal flooding. Severe coral bleaching may occur on an annual basis by 2047. Maximum fisheries catch potential is projected to decline 50% by 2050. Sea level rise will cause coastal inundation, erosion and saltwater intrusion into aquifers. Coastal communities are highly exposed because 25% of the population live within 1 km of the coast. Infrastructure within 500m of the coast accounts for 50% of the total asset number and 46% of the total infrastructure replacement value.”<sup>8</sup>

## **2.1 Strengths, weaknesses, opportunities, and threats analysis**

### **2.1.1 Strengths**

NMS is the sole national authority to provide official meteorological and climate forecast, prediction, information, warning and related services under the Meteorological Services Act 2013.

Niue’s constitutional relationship with New Zealand is one where the external affairs and defence of Niue is the responsibility of New Zealand. Additionally, New Zealand provides grants to pay wages to public employees.

NMS has well established trusting partnership and cooperative relationship with government agencies including NDMO, village councils and communities who are dependent on and utilise NMS’ products and services. Ministries are willing to share resources and information. Good Media Communication dissemination of information is also in place.

Due to its small size with limited population, a tight knit setup has enabled NMS to have continuous engagement with communities and sectors through annual workshops, show days and community events etc. across the island.

Niue Government owns utilities such as water, electricity and telephone communication services therefore the risk of high cost is low, and all utilities are connected in most of the households across the island.

### **2.1.2 Weaknesses**

Niue is geographically isolated and has few resources (agricultural sector consists mainly of subsistence gardening, although some cash crops are grown for export) therefore reliance on imported goods is high. Niue has only one flight path i.e., from Auckland, New Zealand operated by one carrier (Air New Zealand), therefore there is only flight per week.

Niue is susceptible to natural threats (severe weather, droughts, coral bleaching, tropical cyclones and climate change impacts.).

Though the demand for climate and ocean services is increasing, NMS has limited or staff shortage or unskilled and untrained staff. Quite often skilled and trained staff take up higher positions at other Ministries or departments which leave a staff shortage in NMS.

Additionally, NMS does not have access to adequate and appropriate tools and equipment. In some cases, information can be accessed from other sources (government departments, social media etc.). Unreliable and expensive Internet costs and weak telecommunications signals are other challenges NMS face in order to ensure continuous information dissemination is in place. Power grid tends to be unstable too.

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<sup>7</sup> <https://www.rccap.org/library/item/617b945dc5b91>

<sup>8</sup> [https://www.rccap.org/uploads/files/aaa60215-85fd-4020-891c-64c40cb9f0e7/NextGen%20Digital%20Digest\\_Updated.pdf](https://www.rccap.org/uploads/files/aaa60215-85fd-4020-891c-64c40cb9f0e7/NextGen%20Digital%20Digest_Updated.pdf)

### 2.1.3 Opportunities

Niue is well and rightfully placed in the global and regional platform to access multiple donor funding sources (UNEP, UNDP, World Bank, Australian Government, WMO, GCF etc.). Additionally, NMS' long-standing affiliation with the global and regional partners can ensure technical and training support to enhance its capacity in weather, water, climate and ocean services.

Under the CIS-Pac5 Programme, new modern, state of the art technology AWS stations has been installed in Vaipapahi and Liku and a X-band radar will be commissioned at the Hanan Airport NMS Office. This will expand Niue's meteorological and climate observation and database which could enable NMS to develop new products for Niue.

Income generating system can be implemented through tourism sector e.g., charging Tourism Operators and Hotels for services rendered, and charge foreign organisations/businesses for data to partially cover costs of NMS' operation.

### 2.1.4 Threats

Global pandemic such as COVID-19 can impact the local economy and the international flights. "In calendar year 2020, the deficit in goods trade widened to 37% of FY2019 GDP, as a 23.7% decline in exports—mainly noni juice—outweighed the 12.5% drop in imports."

Niue is prone to impacts of weather and climate related threats including climate change. Niue faces a potential long-term threat from coastal erosion. Extreme climate conditions such as droughts is also one of the major threats.

Loss of staff due to migration often affects the local workforce. Usually skilled and qualified people tend to leave for better working conditions, better pay, better lifestyle or to be with families overseas. The Niue Government tends to cut budget for long term sustainability of services (Governments Deficit) which has impact on NMS' operational budget.

A number of regional agencies also publish regional and national climate and ocean monitoring and prediction information on their websites, which can be accessed by the stakeholders. This could encourage national stakeholders to get information elsewhere rather than the NMS. Without proper training, stakeholders could misinterpret and apply misapply the information.

**Table 5: SWOT Analysis for Niue**

<i>Internal</i>	
<b>Strengths</b> [List here all advantages of the organization. What can be relied on to deliver the services?]	<b>Weaknesses</b> [List here anything that could be improved. What is not quite the way it should be yet? What is missing?]
A Meteorology Act 2013 grants protection for the Department (NMS) as the sole authority to be responsible for all components relating to meteorology for Niue.	Limited staff/staff shortage, and/or unskilled/untrained staff
NDMO and other agencies and public and communities are dependent on and utilise NMS' weather and climate information.	Information can be accessed from other sources (government departments, social media etc.)
National government and other agencies have good working and collaborative relationship with NMS.	Unreliable and expensive Internet Costs. Telecommunications – weak or no 4G signals.
Information from NMS are being used for national planning, proposals, projects and decision making.	Costly and expensive consultants/Technical experts to implement activities in Weather, Water and Climate services
NMS has provided good service over many years therefore public trust them.	Lack of tools and equipment at NMS.
Utilities such as water, electricity and telephone communication services are owned by the Niue Government, not by a private	Reporting requirements are very extensive especially for small teams e.g., community projects, UN Projects etc.

company which can have adverse impact on the cost. All government owned utilities are connected in most of the households across the island.	
NMS has continuous engagement with communities and sectors through annual workshops, show days and community events, etc.	Information does not reach other staff, remains with the directors etc.
Niue is a small island with limited population and tight knit community setup therefore outreach programme targeting all communities/villages/people can be achieved.	Generation gaps in villages (elders do not use social media for information).
Village Councils are well coordinated, and villages are small, manageable and committed.	Limited capacity and resources in departments and villages. (Lack of people to draft proposals, plans, secure fundings).
Good Media Communication dissemination of information in place.	Niue is geographically isolated and has few resources (agricultural sector consists mainly of subsistence gardening, although some cash crops are grown for export).
Ministries share resources and information, including contacts for funding.	Reliance on imported goods
New Zealand provides grants to pay wages to public employees.	Skilled and qualified staff at NMS opting to take up higher positions at other ministries/departments.
Donor agencies willing to assist Niue.	Susceptible to natural threats (severe weather, droughts, coral bleaching, tropical cyclones, and climate change impacts).
	Once a week and costly international flight and has only one flight path i.e., from Auckland, New Zealand operated by one carrier (Air New Zealand).
	Unstable Power Grid
	NMS has a small operational budget (\$251,868 was allocated in 2021-2022) therefore relies on regional partners for technical support and training.
<b>External</b>	
<b>Opportunities</b> [List here any potential opportunities to push the organization forward that have not yet been taken advantage of.]	<b>Threats</b> [List here anything that might get in the way of achieving goals, such as uncertain funding or relationships that might break down.]
Availability of multiple donor funding sources (UNEP, UNDP, World Bank, Australian Government, WMO, GCF etc.)	Global pandemic such as COVID-19 impact on the local economy and international flights. "In calendar year 2020, the deficit in goods trade widened to 37% of FY2019 GDP, as a 23.7% decline in exports—mainly noni juice—outweighed the 12.5% drop in imports". <sup>9</sup>
Build on existing technical and training support provided by partner agencies (such as the Bureau, NIWA, NZMet, SPREP, SPC etc.).	Impacts of weather and climate related threats including climate change. Niue faces a potential long-term threat from coastal erosion. Extreme climate conditions such as droughts is also one of the major threats.
New Modern, State of the Art Technology – AWS stations at Vaipapahi and Liku and X-band radar at NMS Office.	High migration rate. Skilled and qualified staff at NMS opting to migrate to New Zealand for better pay.
Income generating opportunities e.g., charging Tourism Operators and Hotels for services rendered.	Regional and national climate and ocean monitoring and prediction information can be accessed via Internet from other sources including Windy.com
Charge foreign organisations/businesses for data to partially cover costs of operation.	Sustainability/lack of funding.

<sup>9</sup> <https://aric.adb.org/niue>

Strong partnership – projects, VCs, Ministries, Departments, CROP agencies.	Extensive damages to buildings and equipment by natural disaster such as tropical cyclones (e.g., TC Heta).
Include Civil Society representative during consultation.	Budget cuts for long term sustainability of services (Governments Deficit).
	Donor support reduced or cut due to Global Recession.
	Political interferences
	Limited public awareness on services if programs are not on-going.
	Duplications – activities, projects and information.
	Lack of communication of important information to the elders within the village.

## 2.2 Political, economic, sociocultural, technological, legal, and environmental analysis

Table 6 outlines the results of a PESTLE analysis providing an understanding of the Niue’s external environment relating to political, economic, sociocultural, technological, legal and environmental (ecological) factors.

**Table 6: PESTLE Factors in relation to the Niue NFWCOS**

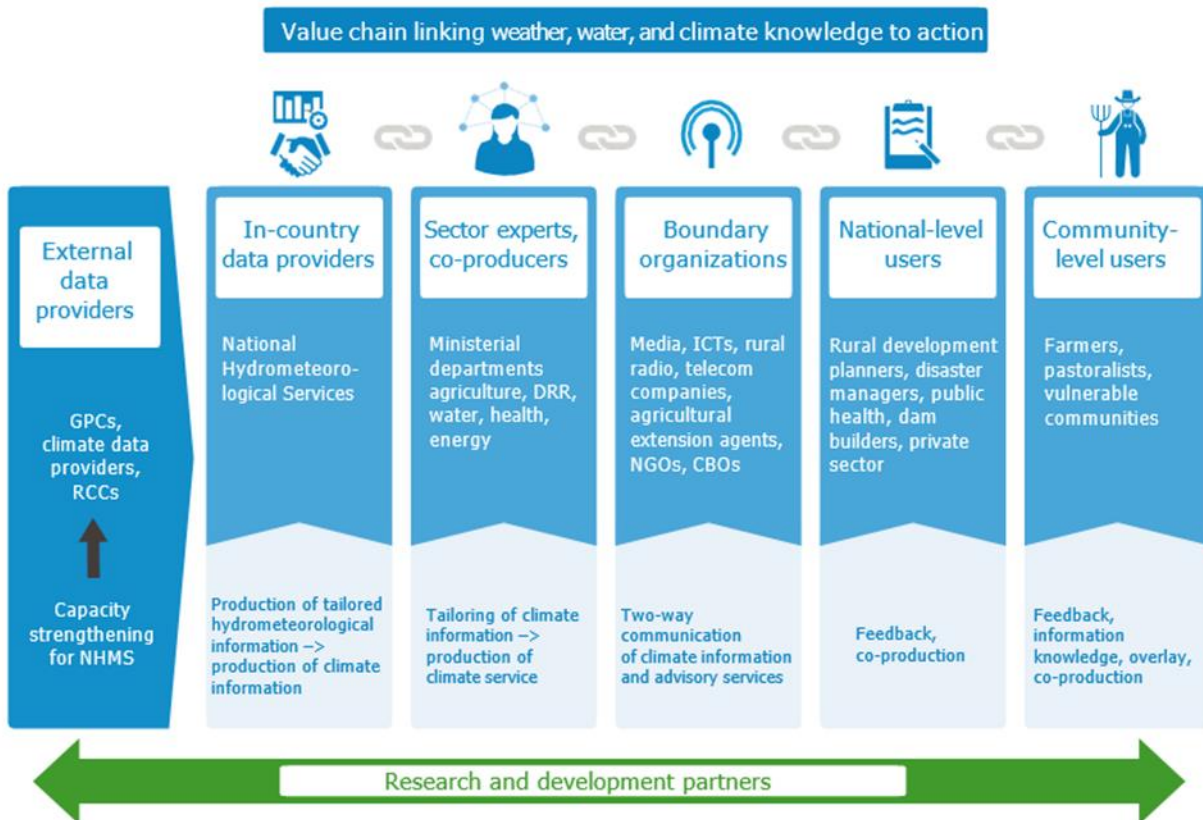
<b>Political factors</b>	<b>Economic factors</b>
International and regional on development paths and areas for action (such as UN Sustainable Development Goals, UNFCC Conference of the Parties, Paris Agreement, Sendai Framework for Disaster Reduction, UN Strategic Framework of Priorities, Framework for Resilient Development in the Pacific, World Meteorological Strategic Plan, and Pacific Islands Meteorological Strategy)	Government expenditures regularly exceed revenues, and the shortfall is made up by critically needed grants from New Zealand.
National decisions on development paths and areas for action (such as National Strategic Plan, Joint National Action Plan for Disaster Risk Management and Climate Change, Second National Communication under the UNFCCC, and Sustainable Coastal Development Policy).	Niue Government tends to cut expenditures by reducing the public service.
Budget cuts for long term sustainability of services (Governments Deficit).	Volatile global economy influence on local economy for example uncertainties related to COVID-19.
Government decisions on funding levels under national budget and bilateral agreements	Changes in the cost of implementing and operating utility infrastructure
Partnership/membership through WMO and UN agencies, SPREP, SPC, the Bureau, NIWA, etc. enables access to satellite data, emerging technologies and tools, expertise and advisory that are not locally available	Economic growth, inflation, interest, and exchange rates
New Zealand retains responsibility for external affairs and defence; however, these responsibilities confer no rights of control and are only exercised at the request of the Government of Niue	Major exports: canned coconut cream, copra, honey, vanilla, passion fruit products, pawpaws, root crops, limes and handcraft.
	Reliance on imported goods is high: food, live animals, manufactured goods, machinery, fuels, lubricants, chemicals, drugs.
	Level of consumers’ disposable income and fiscal policies
	Price fluctuations
<b>Sociocultural factors</b>	<b>Technological factors</b>
Population safety and security, water and food security, sustainable development, increasing prosperity, enhancing resilience to disasters and climate change, and improving public health climate change adaptation and mitigation	Having the required scientific, technological, and human resources capabilities to monitor, forecast and issue warnings of extreme climate events and to fulfil NFWCOS requirements

Decreasing population due to high emigration.	Understanding and integrating the needs of various user communities, including NDMO, into processes to improve the provision of weather, water, and climate services
Growing demand for high-quality weather, water, climate and ocean services.	Ability to provide quick, timely, accurate, broadly disseminated, and understandable information, as well as high-quality services to inform governments and the public
Rapidly changing needs of users.	Participating in and having access to research that leads to improved monitoring, predictions and understanding of the changes in weather, climate, water, and related environmental conditions at all spatial and temporal scales
Literacy rate is 95%.	Building new partnerships with academia, government departments, international and non-governmental organizations, and where appropriate and possible, the private sector and civil society
	Gathering, storing, and exchanging data and working with information through social media channels
	Impact of automatic weather observing systems on staffing levels
	Implementation of the WMO Information System and the WMO Integrated Global Observing System
<b>Legal factors</b>	<b>Environmental (ecological) factors</b>
A Meteorology Bill was passed by the Parliament in 2013.	One of the world's largest coral island, with steep limestone cliffs along coast and central plateau.
Niue's constitutional relationship with New Zealand is one where the external affairs and defence of Niue is the responsibility of New Zealand.	Niue has no surface water, but a deep freshwater lens. It has shallow soils, that support extensive forests and shifting cultivation, and a narrow fringing reef.
Niue has bilateral and multilateral relations with the World Meteorological Organisation (WMO), World Health Organisation (WHO), Pacific Islands Forum (PIF), the South Pacific Community (SPC) and the South Pacific Regional Environment Programme (SPREP). In 2007, Niue established diplomatic relations with China.	Severe weather and tropical cyclone events and associated impacts
Compliant with international standards for meteorological and hydrological services.	Drought, coastal erosion and coral bleaching.
International agreement (ICAO) and local legislation (Civil Aviation Act) supporting aviation, UNFCCC.	Niue has only one wharf for landing and offloading of vessels, which is an open harbour without natural shelter from poor weather conditions, particularly during storm surges.
Party to Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Law of the Sea, Ozone Layer Protection.	

## 2.3 National stakeholder consultation and baseline analysis

The key stakeholders in weather, water, climate and ocean services include users, providers, researchers, co-producers, communicators, boundary organizations, enablers, and partners. It includes key stakeholders from priority sectors for Niue. Collaboration among the identified stakeholders from national, regional and global level enables efficient and effective weather, water, climate and ocean services. They are interconnected partners with complementary roles and make up the national chain of weather, water, climate and ocean services for linking climate and ocean knowledge to adaptation action on the ground (Figure 3). At national and community level, NMS plays a vital role as the provider of weather, water climate and ocean monitoring and prediction information.





**Figure 3: a schematic diagram of the value chain for weather, water, and climate services at the national level<sup>10</sup>**

Table 7 outlines the stakeholders who has interest in and maybe involved in the implementation of the NFWCOS. The list has been derived from the in-country consultation workshop, and past and current engagement with the NMS. The keys sectors for Niue are disaster risk reduction, utilities, agriculture, forestry, subsistence farmers, health and fisheries. (This fits in with the WMO priority sectors. DRR is under the NDMO, agri-forestry-farmers-fisheries is under the same department DAFF, utilities – under Water).

NMS disseminates climate information via email, whereas weather forecast information is disseminated via radio, tv and Facebook. (Weather forecast is also send out via email) NMS frequently directly engage with sectors and communities through workshops, show days and by visiting villages.

Most users receive weather forecast, climate outlooks, climate summaries, and tropical cyclone advisories but they highlighted the following issues:

- Information is very technical and need to be translated in simple or local language.
- Too many “weather experts” and opinions providing incorrect information on Facebook, and sometimes this creates atmosphere of worry and panic.
- Sometimes there is a delay in weather information dissemination.
- Information does not reach other staff in the department as it tends to remain with the directors etc.
- Most elders do no use social media for information therefore do not have on-hand access to information.
- Information sometimes is not distributed beyond the local council.
- Most people use traditional knowledge therefore it is important to demonstrate its linkage with meteorological and oceanic indicators.

<sup>10</sup> Step-By-Step Guidelines for Establishing A National Framework For Weather, Water, And Climate Services

### 2.3.1 Key Stakeholders

Table 7 summarise the key stakeholders ranging from community members to international level who are partners or affiliated with the NMS.

Aligning with Figure 3, NMS is the only in-country data provider, whereas roles for national ministerial departments can be defined as a sector expert, a co-producer, a user or a combination of two or three categories.

**Table 7: Stakeholder Analysis Matrix for Niue**

Category	Stakeholders (type/name)	Interests in the TMS	Expectations from the TMS	Contributions they could make to the TMS
<b>National Level</b>				
User	Niue Legislative Assembly	Laws/regulation data/plans	<ul style="list-style-type: none"> <li>• Oversight of plans, laws and regulations</li> </ul>	
Sector experts User	Niue NDMO	Requires early warning for severe weather and climate related hazards for effective responses decision making.	<ul style="list-style-type: none"> <li>• Continue strong relations, open communications.</li> <li>• Share resources and opportunities to learn and collaborate for better services to communities.</li> <li>• Help build capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• Help to disseminate information to communities.</li> <li>• Help provided data and information to NMS, observations, experiences etc.</li> <li>• Provide feedback on NMS products.</li> </ul>
Sector experts User	Utilities Department	3-day weather forecast to prepare aggregate making, road works, solar panel use and diesel generator use, forward planning.	<ul style="list-style-type: none"> <li>• For information to be accurate.</li> <li>• Timely can be efficient due to emergency call outs.</li> <li>• Also, for forecast roadside Inspections, Building Inspections, water bore inspections.</li> <li>• Efficient communication between departments that do cross cutting work.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a more open communication channel between both departments.</li> <li>• Sharing of information, observations with NMS.</li> <li>• Provide feedback on NMS products.</li> </ul>
User	Climate Change/GCF/PMCU	To receive data and products for effective decision making, planning etc.	Accurate and up to date information.	Enabling channels to GCF funding.
Sector experts User	DAFF (Agriculture): <ul style="list-style-type: none"> <li>• Biosecurity Border Control</li> <li>• Biosecurity and Crops Pest and Disease Control</li> <li>• Crops and Crop Extension</li> <li>• Livestock</li> </ul>	Weather forecast information, and rainfall data.	<ul style="list-style-type: none"> <li>• Tide/swells, weather (rain etc) Forecast for next 3-4 days.</li> <li>• Weather forecasts.</li> <li>• Rainfall data and outlooks.</li> </ul>	<ul style="list-style-type: none"> <li>• Partnership to develop Impact Based Forecasting for Biosecurity &amp; Crops and all DAFF areas - E.g., Pest and Disease Control.</li> <li>• Help to disseminate information to farmers and communities.</li> <li>• Help provided data and information to NMS, observations, experiences etc.</li> <li>• Provide feedback on NMS products.</li> </ul>
Sector experts User	DAFF (Forestry)	Need weather and climate information for planning and decision making for:	Weather forecasts.	<ul style="list-style-type: none"> <li>• Help to disseminate information to farmers and communities.</li> </ul>

		<ul style="list-style-type: none"> <li>• Tractor mowing service.</li> <li>• Forest species.</li> <li>• Bulldozer operations.</li> </ul>		<ul style="list-style-type: none"> <li>• Help provided data and information to NMS, observations, experiences etc.</li> <li>• Provide feedback on NMS products.</li> </ul>
User	Niue Growers Association/NIOFA	Need weather and climate information for planning and decision making for: Growers' events.	Weather forecasting for national events (Taro Festival, Wild Food Festival, and national show days).	<ul style="list-style-type: none"> <li>• Help to disseminate information to communities.</li> <li>• Help provided data and information to NMS, observations, experiences etc.</li> <li>• Provide feedback on NMS products.</li> </ul>
Sector experts User	DAFF (Fisheries)	Need weather and climate information for planning and decisions making for: <ul style="list-style-type: none"> <li>• FAD maintenance and deployment.</li> <li>• Coastal fisheries operations.</li> <li>• Safety at sea for fishers and public.</li> <li>• Wharf and ramp operation.</li> </ul>	Weather forecasts	<ul style="list-style-type: none"> <li>• Help to disseminate information to fishers and public.</li> <li>• Help provided data and information to NMS, observations, experiences etc.</li> <li>• Provide feedback on NMS products.</li> </ul>
User	NIFA and Vaka Association, NOW, Niue Blue, RMACs	Need weather and climate information for fishers and reef users – Marine days	Weather forecasts, awareness.	<ul style="list-style-type: none"> <li>• Help to disseminate information to fishers and public.</li> <li>• Help provided data and information to NMS, observations, experiences etc.</li> <li>• Provide feedback on NMS products.</li> </ul>
User	Sport Organisers	<ul style="list-style-type: none"> <li>• Weather forecast to plan ahead, sports events.</li> <li>• Planning events</li> </ul>	Weather forecast information.	Awareness understanding the weather.
User	Ekalesia Niue	<ul style="list-style-type: none"> <li>• Need weather and climate information for planning and decision making.</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate, consistent, efficient and timely weather and climate information.</li> <li>• Disaster Action Plan is in line with Framework – key aspects are adopted.</li> </ul>	<ul style="list-style-type: none"> <li>• Support and Feedback, smooth running.</li> <li>• Representation in different level – pastoral care – relay information from NMS to community.</li> </ul>
User	Tourism	Having good weather forecast for sightseeing.	Accurate forecasting Traditional knowledge	<ul style="list-style-type: none"> <li>• Help to disseminate information to public.</li> <li>• Provide feedback on NMS products.</li> </ul>
Community level user	Community	Help make decision and planning - weather	Accurate, consistent, efficient and timely.	<ul style="list-style-type: none"> <li>• Support, endorse, provide feedbacks/acknowledgements.</li> </ul>
Community level user	TOAGA Niue	Require weather and climate information and data/plans	Traditional Knowledge/ document archives	<ul style="list-style-type: none"> <li>• Provide TK information to NMS</li> </ul>
Community level user	Women's group	<ul style="list-style-type: none"> <li>• To receive up to date climate and weather information for project planning,</li> </ul>	<ul style="list-style-type: none"> <li>• Accurate, consistent, efficient and timely.</li> <li>• To utilize all avenues to disseminate information.</li> </ul>	<ul style="list-style-type: none"> <li>• Help to disseminate information to communities.</li> </ul>

		<p>fishing, foraging and planting.</p> <ul style="list-style-type: none"> <li>Empower women when understanding data and information, decision making.</li> </ul>	<ul style="list-style-type: none"> <li>Workshops to help women understand the weather and climate data and information, science etc.</li> </ul>	<ul style="list-style-type: none"> <li>Help provided data and information to NMS, observations, experiences etc.</li> <li>Provide feedback on NMS products.</li> </ul>
Community level user	Youths	<ul style="list-style-type: none"> <li>Planning and events. Receiving information for readiness and decision making.</li> </ul>	<ul style="list-style-type: none"> <li>Weekly and 3 monthly forecasts. To provide action plans for future generations.</li> </ul>	<ul style="list-style-type: none"> <li>Help to disseminate information to communities.</li> <li>Awareness, support amongst Youth. Support for services and feedback to NMS.</li> </ul>
Community level user	Vaka fishermen (group)	<p>Seasonal fishing safety. Traditional and craft knowledge</p>	<p>Marine weather forecast</p>	<ul style="list-style-type: none"> <li>Help to disseminate information to fishers and public.</li> <li>Help provided data and information to NMS, observations, experiences etc.</li> <li>Provide feedback on NMS products.</li> </ul>
Community level user	Growers (farmers)	<ul style="list-style-type: none"> <li>Seasonal planting events and calendars e.g., yams, show days, haircutting etc.</li> <li>Data and information to help inform organic farmers/agriculture.</li> </ul>	<ul style="list-style-type: none"> <li>3–months ahead outlooks.</li> <li>To create more open avenues of communications to NGOs such as Organic farmers.</li> </ul>	<ul style="list-style-type: none"> <li>Feedback on harvesting and catch.</li> <li>Advocate for and initiate research into impacts of organic farming on mitigation of climate change.</li> </ul>
Community level user	Hunters	<p>Hunting conditions based on weather.</p>	<p>Accurate forecasting. Rain, moon, temperature, tide.</p>	<ul style="list-style-type: none"> <li>Help to disseminate information to public.</li> <li>Provide feedback on NMS products.</li> </ul>
User	Education (secondary, primary, early childhood, creche and play groups)	<p>Climate information for learning linked to the school curriculum and all current events. Career pathway for students. Traditional knowledge</p>	<p>Children are aware and understand the climate information. Advocates of climate change. Resilient future citizens of Niue. Better prepared.</p>	<p>Support for services and establish partnership through MoU.</p>
User	Students	<p>Learning, good knowledge, weather and climate, conduction.</p>	<p>Training and information from NMS include resources.</p>	<p>Better inform students learning and more knowledge as future leaders.</p>
Boundary organisation	Media agencies (Broadcasting Corporation of Niue (BCN)), Niue Star – Local newspaper but on fortnightly basis	<p>Requires data and products to inform the public</p>	<p>Timely and accurate daily weather forecast, early warning for sever weather and climate events (droughts)</p>	<p>Support for services, disseminate all NMS weather, water, climate and ocean information, provide feedback.</p>
<b>International and Regional</b>				
	Universities including USP	<p>Require data and information for research purposes.</p>	<ul style="list-style-type: none"> <li>To be open to sharing information.</li> <li>Collaboration on regional climate and disaster issues, and in-situ data contribution to global/regional database.</li> </ul>	<ul style="list-style-type: none"> <li>Can provide findings and analysis of various events, scenarios etc.</li> <li>Technical assistance.</li> </ul>

External data provider	SPREP	Regional weather, climate and ocean information	Collaboration on product development and applications (including extreme events) and in-situ data contribution to global/regional database	Technical assistance, funding for projects
External data provider	SPC	Regional weather, climate and ocean information	Collaboration on product development and applications (including extreme events) and in-situ data contribution to global/regional database	Technical assistance, funding for projects
	UN/ IOM, WMO, UNEP, UNDP	Regional weather, climate and ocean information	Collaboration on regional climate and disaster issues, and in-situ data contribution to global/regional database	Technical assistance, funding for projects
	University of the South Pacific	Regional weather, climate and ocean information	Collaboration on regional climate and data issues	Technical assistance
	Donors: DFAT, MFAT, GCF, World Bank, ADB, UNDP	Regional weather, climate and ocean information	Collaboration on regional climate and data issues	Technical assistance, funding for projects
External data provider	Bureau, NZMet, NIWA, APCC, CSIRO, GA	Regional weather, climate and ocean information	Collaboration on product development and applications (including extreme events) and in-situ data contribution to global/regional database	Technical assistance, funding for projects

## 2.4 Conclusions from the environmental scan

The role of NMS as the sole national authority to provide official meteorological and climate information services is protected by the Meteorological Act. Due to its small size with limited population, NMS has established a cooperative relationship with communities and sectors agencies including ministries, departments and village councils. Resources and information sharing amongst the departments is not uncommon.

Through Niue's constitutional relationship with New Zealand, they receive grants to pay wages to public employees.

NMS has limited staff and staff turnover tends to be high because quite often skilled and trained staff take up higher positions at other ministries or departments or migrate especially to New Zealand. Through the Girls' Brigade program NMS identifies young and capable women to recruit into the service.

There is a demand for high-quality weather, water, climate and ocean services but the current status of the products still remain too technical. Niueans tend to use traditional knowledge for farming, fisheries and other activities but they are open to use NMS products if they are relevant and applicable to their respective sectors or use.

Through donor funded projects, NMS is likely to expand its observation network, staffing, skills and technology to develop new and improved weather, water climate and ocean products and services. Therefore, long term strategy planning to sustain NMS' growing capacity to provide better weather, water, climate and ocean services is critical.

Furthermore, NMS Corporate Plan 2020-2025 highlights the following challenges for NMS:

- **“Securing the right staff:** Additional staff may be needed to address some of the gaps such as in climate data analysis. New recruits are trained and expected to meet the requirement of undertaking a competency assessment for meteorological observations.

Utilising regional and international programmes can provide opportunities for staff to increase their skills and knowledge in weather prediction and climate science. Staff members are encouraged to pursue studies through online short-term courses or at tertiary level where available.

- Technical failure: As a back-up during power outage, NMS rely on a diesel-powered generator housed at the Rescue Fire, Civil Aviation.
- Infrastructure: Financial resources are crucial in order to maintain, calibrate and replace obsolete and malfunction equipment. Having a climate-proofed building and a well-established observation station thus provides accurate data and credible information for users.”

### **3 Vision, mission, and purpose for the Niue Meteorological Services**

#### **3.1 Vision**

A prime driver of weather and climate services.

#### **3.2 Mission**

To provide credible and timely weather and climate services for all stakeholders.

#### **3.3 Purpose**

To provide timely and reliable weather, climate and climate change information for the safety of life and property.

### **4 Goals, objectives, and strategies for the National Framework for Weather, Water, Climate and Ocean Services for Niue**

Based on the conclusions from the environmental scan and in-country consultation workshop, key national plans and strategies, NMS Corporate Plan, this section outlines the strategic goals, objectives and strategies for the NFWCOS for Niue. The overall objective for the NFWCOS is to enable NMS to fully realise its organisational Vision, Mission and Purpose as outlined in Section 3.

Niue’s NFWCS’ goals and objectives aim to achieve all or most of the Priority Key Outcomes (PKO) of the Pacific Islands Meteorological Strategy (PIMS) 2017 – 2027:

- PKO 1: Improved aviation weather services
- PKO 2: Improved marine weather services and
- PKO 3: Improved public weather services
- PKO 4: Strengthened NMHSs capacity to implement Multi-Hazard Early Warning Systems
- PKO 5: NMHSs contribution to climate change activities
- PKO 6: Improved climate information and prediction services
- PKO 7: Strengthen collaboration between meteorological and hydrological services to better manage water resources and reduce the impact of water related hazards
- PKO 8: Integrated observing and communication systems
- PKO 9: NMHSs institutional strengthening and capacity development
- Through effective governance, communication, knowledge management and financial management using training and technology.
- PKO 10: Support to NMHSs is coordinated for donors and technical agencies interacting with NHMSs and regional agencies.
- PKO 11: PMC is efficient and effective via partnerships, inclusivity, and consideration of staff safety, with funding support.

Furthermore, NFWCOS is aligned with the Pacific Roadmap for Strengthening Climate Services (PRSCS) 2017-2026 which is built on PKO6 and Global Framework for Climate Services (GFCS). The objective for PRSCS is “The implementation of climate services in the Pacific that maximise benefits and manage risks through the application of scientifically based climate information integrated with sector and indigenous knowledge to support planning, policy and practice on regional and national scales”. The activities in the Action Plan (Table 10) fall under the GFCS’s five pillars:

1. User Interface Platform
2. Climate Services Information System
3. Observation and Monitoring
4. Research, Modelling and Prediction
5. Capacity Development

#### **4.1 Goals, Objectives and Strategies**

**Goal 1:** Strengthen Niue Meteorological Services’ ability and infrastructure to provide improved, robust and undisrupted national weather, climate including climate change and ocean services and warnings to meet national to community level user needs.

**Objective 1.1:** Improve institutional and human resources capacity development.

**Objective 1.2:** Enhance NMS’ national weather, climate including climate change and ocean products and services to meet national to community level user needs.

**Goal 2:** Strengthen Niue Meteorological Services’ partnership and coordination with the ministries and departments, national sectoral agencies, private sectors and communities to improve service delivery, increase the effectiveness and proper use of meteorological, ocean, climate products and services.

**Objective 2.1:** Establish an on-going two-way communication platform between NMS and users of weather, climate and ocean products and services.

**Objective 2.2:** Enhance and formalise NMS’ partnership with key government and sectoral agencies.

**Objective 2.3:** Establish forecast-based financing system for Niue in partnership with the Treasury Department to implement mitigation measures in response to severe weather and climate warnings.

**Goal 3:** Enhance understanding and usage of weather, climate including climate change and ocean products and services and warnings by key stakeholders including government, private sectors, FBOs, CSOs, NGOs and village communities.

**Objective 3.1:** Conduct comprehensive awareness and outreach programme for all stakeholders on understanding and usage of weather, climate including climate change and ocean products and services and warnings.

**Objective 3.2:** Integrate traditional knowledge into climate and ocean information services to better communicate NMS’ products.

**Goal 4:** Improve and maintain the meteorological, climate and ocean observation network and data collection across Niue.

**Objective 4.1:** Enhance and maintain national weather, climate and ocean observations and monitoring networks.

**Objective 4.2:** Enhance and maintain meteorological and climate database for Niue.

**Table 8: Goals, Objectives and Strategies for NFWCOS**

<b>Goal 1: Strengthen Niue Meteorological Services' ability and infrastructure to provide improved, robust and undisrupted national weather, climate including climate change and ocean services and warnings to meet national to community level user needs.</b>						
<b>Objectives</b>	<b>Strategies</b>	<b>Outputs</b>	<b>Timeframe</b>	<b>Responsibilities</b>	<b>Status</b>	<b>PIMS PKOs</b>
<b>Objective 1.1:</b> Improve institutional and human resources capacity development	A new NMS' office building with upgraded equipment, improved ICT infrastructure, furniture and uninterrupted power supply	New NMS building completed, and fully operational	5 years	MNR Finance & Planning (F&P)		9
	Review and update staffing structure, and recruit all vacant positions	Fully resourced NMS to adequately provide meteorological, climate and ocean services to meet national requirements	5 years	MNR Finance & Planning (F&P)		9
	NMS staff to undertake training and assessments to achieve competency certified requirements	NMS staff members are competent to perform their designated duties	5 years	NMS		4 7 8
<b>Objective 1.2:</b> Enhance NMS' national weather, climate including climate change and ocean products and services to meet national to community level user needs	Develop improved and tailored climate and ocean products and services, including impact-based forecasting (fisheries, health and coral bleaching)	Simplified and tailored climate and ocean products and services targeting specific sectors and community	5 years	NMS	Funded by CIS-Pac5	6
	Build Multi-Hazard Early Warning Systems (MHEWS) at NMS	Early Warning Systems in place to cover hazards including tropical cyclones, coastal inundation, drought and tsunami	5 years	NMS		4 7
	NMS contributing to global and regional climate change research and scenario risk analysis and participating and contributing consistently to all levels of forums to inform implementation of climate change activities whether directly or indirectly implied in plans and policies.	NMS continuously contribution to climate change activities	Ongoing	NMS MNR PMCU		5



<b>Goal 2: Strengthen Niue Meteorological Services' partnership and coordination with the ministries and departments, national sectoral agencies, private sectors and communities to improve service delivery, increase the effectiveness and proper use of meteorological, ocean, climate products and services.</b>						
<b>Objective 2.1:</b> Establish an on-going two-way communication platform between NMS and users of weather, climate and ocean products and services	Build upon the current stakeholder communication network to establish an on-going platform for dialogue between NMS and users of weather information and services, where clients make known their needs to NMS	Effective on-going channel of communication in place to inform the people and government stakeholders on NMS' products and services	Ongoing	NMS	Funded by CIS-Pac5	6 9
<b>Objective 2.2:</b> Enhance and formalise NMS' partnership with key government and sectoral agencies	Establish formal arrangement or Memorandum of Understanding with key government department and sectorial agencies	MoUs between NMS and key government and sectoral agencies in place	5 years	NMS MNR DAFF	Partially funded by CIS-Pac5 (SOPs)	9
<b>Objective 2.3:</b> Establish forecast-based financing system for Niue in partnership with the Treasury Department to implement mitigation measures in response to severe weather and climate warnings	Investigate and document all possible cost-recovery means and potential revenue available to NMS	Market assessment on NMS products and services report  Financial policy to implement cost recovery at NMS	1 year	NMS MNR F&P	Funded by CIS-Pac5	1 9
	Develop and establish a forecast-based-financing system for Niue with support from an appropriate regional partner	Better and well-funded responses to severe weather and climate impacts in place	2 years	NMS MNR F&P	Funded by CIS-Pac5	4
<b>Goal 3: Enhance understanding and usage of weather, climate including climate change and ocean products and services and warnings by key stakeholders including government, private sectors, FBOs, CSOs, NGOs and village communities.</b>						
<b>Objective 3.1:</b> Conduct comprehensive awareness and outreach programme for all stakeholders on understanding and usage of weather, climate including climate change and ocean products and services and warnings	Public education and awareness workshops on MHEWS including severe weather, tropical cyclone, droughts etc undertaken in conjunction with relevant authorities.	Increased public knowledge on early warning messages	Ongoing	NMS NDMO	Funded by CIS-Pac5	4
	Undertake a comprehensive civic education programme through radio and other modes to help people and Government stakeholders understand and appreciate the value of NMS products and services.	Increased public knowledge on NMS weather, climate and ocean products and services	Ongoing	NMS	Funded by CIS-Pac5	3 6 8 9
	Publish pamphlets on various topics	Readily available public awareness	2 years	NMS MNR	Funded by CIS-Pac5	3

	such as weather, climate, hydrology, oceans and other related environments explaining NMS' services and products. All these to be published both in Niuean and English languages	and outreach programme in place				6 8 9
	Work with local communities to develop knowledge and skills, build confidence and self-esteem as a pathway into further understanding NMS services, impact of climate change and natural disasters.	Well informed and well-prepared communities when preparing and responding to impending natural disasters	2 years	NMS NDMO VCs	Funded by CIS-Pac5	5
<b>Objective 3.2:</b> Integrate traditional knowledge into climate and ocean information services to better communicate NMS' products	The use of traditional and local knowledge and practices to complement scientific knowledge and existing and established practices is applied consistently.	Increased community confidence in scientific based information	Ongoing	NMS VCs	Funded by CIS-Pac5	4 5 6
<b>Goal 4: Improve and maintain the meteorological, climate and ocean observation network and data collection across Niue.</b>						
<b>Objective 4.1:</b> Enhance and maintain national weather, climate and ocean observations and monitoring network	Enhance national observations and monitoring networks.	Meteorological and climate data available for more locations in Niue	5 years	NMS PMCU	Funded by CIS-Pac5	8
<b>Objective 4.2:</b> Enhance and maintain meteorological and climate database for Niue	Establish on-going ingestion of real-time data from AWSs and wave buoys into CliDE	Up to date quality-checked and readily accessible climate database at NMS	6 months	NMS	Funded by CIS-Pac5	8
	Digitise and back-up all meteorological data into CliDE	Up to date quality-checked and readily accessible climate database at NMS	2 years	NMS	Funded by CIS-Pac5	8

## 5 Governance structures

### 5.1 Governance structures for the NFWCOS

Recognizing that Niue has a well-established National Coordinating Committee (NCC) under the CIS-Pac5 Program in place, it was recommended that the oversight of the implementation and operationalising of NFWCOS can also fall under the responsibility of NCC. The National Designated Authority for GCF is the Committee Chair and the members comprise of all national implementing partners including NMS. Therefore, NCC can be accountable for ensuring that NFWCS is endorsed

by the Niue Parliament and implemented. This also involves NFWCOS to reviewed and updated when and as required.

## 6 Support programmes

### 6.1 Stakeholder coordination

The stakeholders identified in Section 2.3.1 have varying level of interest in weather, water, climate and ocean services for Niue. Section 6.3 outlines the communication platforms that can be utilised to coordinate actions, investments, and initiatives of complex and multiple stakeholders operating in the weather, water, and climate services at regional, national, and local levels.

### 6.2 Communication programmes

Table 9 provide communication platforms through which identified stakeholders (donors, national government ministries/departments, sector-specific practitioners/officials, researchers, media, and communities) can be reached.

At national level, NFWCOS Committee (NCC for Niue) will be tasked to communicate progress, challenges, and successes of the implementation of the framework, and to ensure coordination amongst the national stakeholders and with the regional implementation partners.

**Table 9: Communication Platforms at national and regional levels**

Type of Users	Communication Platform	How Often
Ministries	Cabinet Briefs	Weekly
	NCC	Monthly/Quarterly
Government Departments	NCC	Monthly/Quarterly
	NCOFs	Yearly
Communities and Villages	Village Council meetings	Monthly
	NCC	Monthly/Quarterly
	NCOF	Yearly
Media	NCC	Monthly/Quarterly
	NCOF	Yearly
Donors	PMC Meetings	2 yearly
	Pacific Forum Meetings	
Regional Partners	PMC Meetings	2 yearly
	CIS-Pac5 Steering Committees	Six-monthly
	PMC Expert Panels (such as PICS, PIMOS, PIETR)	
	WMO RAV Expert Panels	

## 7 Developing a national implementation / action plan

Table 10 outlines the activities that are required to achieve the Goals and Objectives agreed upon by the NFWCOS. The timeframe designated for each activity ranges from 1 to 5 years (i.e., Month 1/Year 1 to Month 12/Year 5). It also includes organisation responsible to implement, and estimated costs (where available), inputs required and priority ranking (low/medium/high) for each activity.

The following activities have secured funding allocation through the CIS-Pac5 until 2026.

- Funding of the following positions at NMS after 2026: Climate Expert; Ocean Expert; Technical Officer (IT) and Climate Data Officer.
- Training of NMS technicians at WMO training centre and GTS messaging and instrument maintenance.
- Basic Information Package Meteorological Training (BIP-MT), and QMS training.

- Training on climate forecasting, CREWS, EAR Watch etc.
- Training on translating key messages from the climate and ocean bulletins into local language for the communities.
- Conduct market assessment to explore viable opportunities for climate information services in sectors and business segments.
- Customise early warning information and products for end-users.
- Training on ocean services including impact-based ocean forecast system, including attachment training at SPC.
- Develop community climate adaptation plans and updating of the current Vulnerability & Adaptation Assessment tool (CCAP).
- Ministers Climate Briefing workshops per year.
- Developing Climate Sector Action and Communication Plan (CSACP) for five priority sectors.
- Conducting National Climate Outlook Form once a year.
- Workshops to define functions, roles and responsibilities of key EWS actors and develop early warning communication strategies with community feedback mechanisms.
- Develop, trial and refine Standard Operating Procedures (SOPs).
- Development of Forecast-based Financing (FbF) Roadmaps defining thresholds and triggers with technical support from the Red Cross Red Crescent Climate Centre.
- Establishing community-based response mechanisms to extreme weather/climate and disaster risk reduction in communities.
- Conducting awareness workshop twice per year.
- Develop workbooks for Niue's weather and climate.
- Develop communication products such as brochures, Posters, Factsheet etc.
- NMS will install village "compass" boards and signposts, with pointers to known locations, for dissemination of climate information in a more understandable format.
- Conduct Talanoa sessions on climate related stories with elders.
- Sector Specific Climate Training Program (SSCTP) for five priority sectors and train the trainer for the sectors workshops.
- NMS will enhance communication channels and early warning systems through the development of multiple-channel climate and ocean information products: increase climate radio talk show, develop ocean and climate mobile app.
- Public awareness and education campaigns to enhance community knowledge and understanding of disaster management and climate awareness.
- A workshop a year to co-design, co-produce information products to improve warning messages to island communities and provide clear guidance for triggering response actions.
- Integrating related Traditional Knowledge with Early Warning System for public awareness and outreach programs.
- Installation of new/upgraded AWS at Vaipapahi and Liku (completed).
- Procuring and installing a new AWOS at the Hanan Airport.
- Procuring and installation of X Band Doppler radar at the Hanan Airport NMS Office.
- Procuring and deployment of a wave buoy.
- Real-time AWS integration to CliDE.

Noting that CIS-Pac5 is currently scheduled to be completed by 2026, and the implementation of NWFCOS may begin 2024, all CIS-Pac5 funded activities are scheduled from Y1 to Y3.

**Table 10: Action Plan for Niue**

Key Outcome 1: NMS is well equipped and has the capacity and knowledge to provide required national weather, climate and ocean services for Niue					
Key Indicators:					
<ul style="list-style-type: none"> <li>• New or upgraded NMS building at Hanan Airport.</li> <li>• Increased number NMS staff with appropriate skills and training in weather, climate and ocean services.</li> <li>• New and improved water, climate and ocean products and services tailored to meet users' needs.</li> <li>• NMS continuously abreast with emerging climate change projections and related information on global and regional platforms.</li> <li>• National climate change policies and plans are well informed and widely consulted.</li> </ul>					
Objectives	Activities	Timeframe	Organisation Responsible	Costs (AUD)/Inputs	Priority (L/M/H)
Objective 1.1: Improve institutional and human resources capacity development	Activity 1.1.1: Construct a new building or upgrade the infrastructure (building, ICT and power supply etc.) for NMS Office at Hanan Airport	M1Y2 – M12Y5	MNR NMS Treasury Department (TD)	TBD	H
	Activity 1.1.2: Integrate Project funded climate expert, ocean expert, Data Entry Officer and a Technical Officer into NMS staffing structure and budget	Ongoing after M12Y3	MNR NMS TD	Climate Expert and Ocean Expert: Salary x 2/year Data Entry Officers and Technical x 2/year	High
	Activity 1.1.3: Basic Information Package Meteorological Training (BIP-MT), and QMS training for NMS staff	Y3	NMS PMCU	Funded by CIS-Pac5	High
	Activity 1.1.4: Training of NMS technicians at WMO training centre including GTS messaging and instrument maintenance	Y3	NMS PMCU	Funded by CIS-Pac5	High
	Activity 1.1.5: Training on climate forecasting and warning system (e.g., CREWS, EAR Watch etc.)	Y3	NMS PMCU	Funded by CIS-Pac5	High
	Activity 1.1.6: Training on ocean products and services including impact-based	Y2-Y3	NMS PMCU	Funded by CIS-Pac5 until Y3	Medium

	ocean forecast system				
	Activity 1.1.7: Training of NMS staff on translating key messages from the climate and ocean bulletins into local language for the communities	Y3	NMS PMCU Education Department?? USP??	Funded by CIS-Pac5	High
	Activity 1.1.8: Conduct market assessment to explore viable opportunities for climate information services in sectors and business segments	Y4	NMS MNR PMCU TD	Funded by CIS-Pac5	Medium
Objective 1.2: Enhance NMS' national weather, climate including climate change and ocean products and services to meet national to community level user needs	Activity 1.2.1: Develop climate early warning system including impact-based forecasting for fisheries and health)	Y4	NMS PMCU	Partially funded by CIS-Pac5	Medium
	Activity 1.2.2: Develop Ocean services including impact-based ocean forecast system (e.g., coral bleaching)	Y4	NMS PMCU	Funded by CIS-Pac5	Medium
	Activity 1.2.3: Build Multi-Hazard Early Warning Systems (MHEWS) at NMS	M1Y1 – M12Y5	NMS NDMO DAFF	TBD	Medium
	Activity 1.2.4: Develop customised or tailored climate and ocean bulletins to specific sectoral needs	Y2 – Y4	NMS PMCU NDMO DAFF	TBD Partially funded by CIS-Pac5	Medium
	Activity 1.2.5: Develop community climate adaptation plans and updating of the current Vulnerability & Adaptation Assessment tool (CCAP)	Y1-Y3	NMS PMCU	Funded by CIS-Pac5	High
	Activity 1.2.6: NMS actively participating and contributing in	Ongoing	NMS MNR PMCU	Nil	High

	global, regional and national forums to inform implementation of climate change activities in plans and policies				
	Activity 1.2.7: NMS actively participating in global and regional climate change research and scenario analysis with support from CROP agencies	Ongoing	NMS MNR PMCU	TBD	High

**Key Outcome 2: Ministries and departments, national sectoral agencies, private sectors, and communities are proactively partnering and collaborating with NMS on weather, climate and ocean service delivery and usage.**

**Key Indicators:**

- Increased share of NMS from the Government annual budget allocation.
- Ministries and departments, national sectoral agencies, private sectors, and communities are well informed on NMS' weather, climate and ocean products and services.
- Active platform or communication channels in place for sharing and weather, climate and ocean information and seeking feedback.
- Funds are allocated when appropriate triggers are met, associated with severe weather and climate warnings.

Objective 2.1: Establish an on-going two-way communication platform between NMS and users of weather, climate and ocean products and services.	Activity 2.1.1: NMS to conduct Ministers Climate Briefing workshops per year	Ongoing	NMS MNR PMCU	Funded by CIS-Pac5 until Y3	High
	Activity 2.1.2: Develop Climate Sector Action and Communication Plan (CSACP) for five priority sectors.	Y3 -Y5	NMS MNR PMCU NDMO DAFF	Funded by CIS-Pac5	High
	Activity 2.1.3: Workshops to define functions, roles and responsibilities of key EWS actors and develop early warning communication strategies with community feedback mechanisms.	Y1	NMS MNR PMCU NDMO VCs	Funded by CIS-Pac5	Medium
	Activity 2.1.4: Conduct National Climate Outlook Form once a year (Align with Pre/Post TC Community	Ongoing	NMS PMCU	Funded by CIS-Pac5 until Y3	Medium

	workshop with NDMO)				
Objective 2.2: Enhance and formalise NMS' partnership with key government and sectoral agencies	Activity 2.2.1: Formulate and finalise MoUs between NMS and key government and sectoral agencies	Y1 – Y2	MNR NMS NDMO DAFF	Nil	High
	Activity 2.2.2: Develop, trial and refine Standard Operating Procedures (SOPs) with key EWS actors (Align with National Disaster Council SOP).	Y1	MNR NMS PMCU NDMO	Funded by CIS-Pac5	Medium
Objective 2.3: Establish forecast-based financing system for Niue in partnership with the Treasury Department to implement mitigation measures in response to severe weather and climate warnings	Activity 2.3.1: Development of Forecast-based Financing (FbF) Roadmaps defining thresholds and triggers with technical support from the Red Cross Red Crescent Climate Centre.	Y1-Y4	NMS PMCU NDMO TD	Funded by CIS-Pac5	Medium
<b>Key Outcome 3: National to community level stakeholders are able to understand and use NMS' weather, climate and ocean products and information.</b>					
<b>Key Indicators:</b>					
<ul style="list-style-type: none"> <li>Increased number of the users (including departments, national sectoral agencies, private sectors, FBOs, CSOs, NGOs and village communities) understand NMS' weather, climate and ocean products and information.</li> <li>There is an increases number of departments, national sectoral agencies, private sectors, FBOs, CSOs, NGOs and village communities using NMS' weather, climate and ocean products and information for decision-making in their respective sector.</li> </ul>					
Objective 3.1: Conduct comprehensive awareness and outreach programme for all stakeholders on understanding and usage of weather, climate including climate change and ocean products and services and warnings	Activity 3.1.1: Conduct a survey to assess community knowledge and practices.	Y1	NMS PMCU NDMO NGOs/CSOs/FBOs	TBD	High
	Activity 3.1.2: Establish community-based response mechanisms to extreme weather/climate and disaster risk reduction in communities	Ongoing	NMS PMCU NDMO NGOs/CSOs/FBOs	Funded by CIS-Pac5 until Y3	High



Activity 3.1.3: Public awareness and education campaigns to enhance community knowledge and understanding of disaster management and climate awareness	Ongoing	NMS PMCU	Funded by CIS-Pac5 until Y3	High
Activity 3.1.4: Develop workbooks on Niue's weather and climate targeting schools	Y3	NMS PMCU Education Department USP??	Funded by CIS-Pac5	High
Activity 3.1.5: Develop communication products such as brochures, Posters, Factsheet etc.	Y3	NMS PMCU	Funded by CIS-Pac5	High
Activity 3.1.6: Install village "compass" boards and signposts, with pointers to known locations, for dissemination of climate information in a more understandable format	Y2-Y4	NMS PMCU	Funded by CIS-Pac5	High
Activity 3.1.7: Conduct Talanoa sessions on climate related stories with elders. Includes recordings, videos, documentation	Ongoing	NMS PMCU	Funded by CIS-Pac5 until Y3	High
Activity 3.1.8: Develop multiple-communication channels for climate and ocean, and early warning system information dissemination (such as increase climate radio talk show, ocean and climate mobile app.	Y2-Y4	NMS PMCU	Funded by CIS-Pac5	High
Activity 3.1.9: Sector Specific Climate Training Program (SSCTP)	Y1	NMS PMCU	Funded by CIS-Pac5	Medium

	for five priority sectors and train the trainer for the sectors workshops				
	Activity 3.1.10: A workshop a year to co-design, co-produce information products to improve warning messages to island communities and provide clear guidance for triggering response actions	Ongoing	NMS PMCU VCs	Funded by CIS-Pac5 until Y3	Medium
Objective 3.2: Integrate traditional knowledge into climate and ocean information services to better communicate NMS' products.	Activity 3.1.2: Conduct verification and analysis of TK indicators	Y3	NMS PMCU	Funded by CIS-Pac5	High
	Activity 3.1.2: Integrating related Traditional Knowledge with Early Warning System for public awareness and outreach programs	Ongoing	NMS PMCU	Funded by CIS-Pac5	High
<b>Key Outcome 4: Niue has access to high quality meteorological, climate and ocean database across the country</b>					
<ul style="list-style-type: none"> <li>• <b>Key indicators:</b></li> <li>• <b>Fully operational X band radar at Hanan Airport.</b></li> <li>• <b>Fully operational wave buoy off the Niue coast.</b></li> <li>• <b>Fully operational AWOS at Hanna Airport.</b></li> <li>• <b>Up to data climate database in place at NMS.</b></li> </ul>					
Objective 4.1: Improve and maintain the meteorological, climate and ocean observation network and data collection across Niue.	Activity 4.1.1: Procure and install an X Band Doppler radar at Hanan Airport NMS Office	Y4-Y5	NMS PMCU	Funded by CIS-Pac5	High
	Activity 4.1.2: Procure and install a wave buoy	Y3-Y4	NMS PMCU	Funded by CIS-Pac5	High
	Activity 4.1.3: Procure and install a new AWOS at the Hanan Airport	Y2	NMS PMCU	Funded by CIS-Pac5	High
Objective 4.2: Enhance and maintain meteorological and climate database for Niue	Activity 4.2.1: Establish an ongoing ingestion of real-time data from AWSs and wave buoy into CiIDE	Y3-Y5	NMS PMCU	Funded by CIS-Pac5	High
	Activity 4.2.2: Digitise and back-up all national	Ongoing	NMS PMCU	Funded by CIS-Pac5	High

	meteorological data into CliDE and iCloud				
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## 7.1 Risk Assessment and Mitigation Measures

Based on the goals, objectives, and strategies established in Section 4, a general risk assessment was conducted to consider the risks of actions to meet or to not meet these goals.

**Table 11: Risk Matrix for NFWCOS Goals**

Goals	Objectives	Potential Risks	Potential Impact	Likelihood	Mitigation Measures
Goal 1: Strengthen Niue Meteorological Services' ability and infrastructure to provide improved, robust and undisrupted national weather, climate including climate change and ocean services and warnings to meet national to community level user needs	Objective 1.1: Improve institutional and human resources capacity development	High staff turnover	NMS unable to provide some of its essential and other regular products and services	M	Improve recruitment and retention of trained staff, ongoing training, prioritise non-essential services according to stakeholders' needs
		Limited or no people with relevant qualification are available locally	NMS is unable to or there is long delay in back-filling positions. Disruptions to delivery of regular services	H	Continuously encourage young students to consider a career in meteorology/climate through open days, attachments or volunteering
		No or limited funding for training of new staff and new/upgraded equipment and tools	NMS is unable to meet required standards for its products and services	M	Lobby for funding from the Niue government, and seek opportunities to secure donor arrangements
	Objective 1.2: Enhance NMS' national weather, climate including climate change and ocean products and services to meet national to community level user needs	Lack of quality and timely meteorological data	Unable to further develop current or new products and services	M	Improve observational network, maintenance and calibration plan is in place and being implemented
		Limited or no appropriate sectoral data available	Unable to improve or develop new tailored products and services including MHEWS and CLEWS	H	Seek other venues or methodology to develop sectoral specific products. Through partnership and collaboration, digitise whatever appropriate sectoral data are available
		Limited or no funding	NMS is unable to provide critical, and other relevant and required products and services	M	Lobby for funding from the Niue government, seek opportunities to secure donor arrangements
		NMS has inadequate staff to keep up with the increased products and services	NMS is unable to continue supporting products and services including MHEWS and CLEWS	H	Lobby for increased operational budget from the Niue government

Goal 2: Strengthen Niue Meteorological Services' partnership and coordination with the ministries and departments, national sectoral agencies, private sectors and communities to improve service delivery, increase the effectiveness and proper use of meteorological, ocean, climate products and services	Objective 2.1: Establish an on-going two-way communication platform between NMS and users of weather, climate and ocean products and services	Little interest or trust in NMS products and expertise by national agencies and communities	NMS products and services not fully realised at national ad community levels	M	Ongoing or regular awareness and training workshops targeting key stakeholders
		NMS has inadequate staff to support the new communication platforms	Communication and engagement between NMS and their key stakeholders are reduced or become ad-hoc	M	Develop an NMS communication plan in consultation with all key stakeholders – the plan should identify an effective but manageable communication platforms that can be implemented by NMS.
	Objective 2.2: Enhance and formalise NMS' partnership with key government and sectoral agencies	Little interest or trust in TMS products and expertise by national government and sectoral agencies	NMS products and services not fully realised at national ad community levels	M	Ongoing or regular awareness and training workshops targeting key stakeholders
	Objective 2.3: Establish forecast-based financing system for Niue in partnership with the Treasury Department to implement mitigation measures in response to severe weather and climate warnings	Little or no interest by national government and other relevant government agencies	Response to mitigate weather and climate related adverse impacts or disaster can be delayed	H	Ministerial briefing should include background information and the benefits of implementing FbF system in Niue
		Limited or no surplus funding available	Forecast-based financing system becomes ineffective	M	Ministerial briefing should include background information and the benefits of implementing FbF system in Niue
Goal 3: Enhance understanding and usage of weather, climate including climate change and ocean products and services and warnings by key stakeholders including government, private sectors, FBOs, CSOs, NGOs and village communities	Objective 3.1: Conduct workshops for all stakeholders on understanding and usage of weather, climate including climate change and ocean products and services and warnings.	Little interest or trust in NMS products and expertise by national agencies and communities	NMS products and services not fully realised at national ad community levels	M	Ongoing or regular awareness and training workshops targeting key stakeholders
		Oversimplifying information and losing its accuracy.	Users misinterpreting the information and warnings and taking which could lead to not taking appropriate actions.	H	Effective communication plan in place, proactive stakeholder engagement in place, ongoing training and awareness workshops taking national agencies and communities.
		Limited or no funding	NMS is unable to run ongoing workshops and training of stakeholders	M	Lobby for funding from the Niue government, and seek opportunities to secure donor arrangements
	Objective 3.2: Integrate	Community members including	Integration of TK knowledge into	M	NMS to work closely with the Village

	traditional knowledge into climate information services to better communicate NMS' products	elders unwilling to share TK information/data	climate information will be limited or incomplete		Councils and elders, and have a formal agreement such as MoU in place to assure safeguard of the TK knowledge
Goal 4: Improve and maintain the meteorological, climate and ocean observation network and data collection across Niue	Objective 4.1: Enhance and maintain national weather, climate and ocean observations and monitoring networks	Long-term sustainability of the new automatic weather stations	Equipment failure, loss of data, lack of reporting and issuing warnings	H	Maintenance and calibration plan is in place and being implemented. Met Officers trained to carry out basic maintenance and calibration process.
	Objective 4.2: Enhance and maintain meteorological and climate database for Niue.	Telecommunication failure	Disrupt real-time AWS data ingestion into CiIDE – gaps in database	H	Solar powered back-up in place

## 8 Financing the Strategic Plan

There are several bi-lateral and multi-lateral sources of funding for enhancing weather, water, climate and ocean services for the Pacific Island Nations. Niue is already a recipient of two such major donor funded projects: Enhancing Climate Information and Knowledge Services for Resilience in 5 Island Countries of the Pacific Ocean and Climate and Ocean Support Program in the Pacific<sup>11</sup>. Other funding and technical support are available through various initiatives and donor-country opportunities (WMO, SPREP, SPC, UNDP, and World Bank). Donors often provide assistance through SPC and SPREP.

Under the CIS-Pac5 programme, detailed market assessment will be carried to inform the development of a financial policy to ensure that NMS have the means to sustain and ensure the ongoing operation of their mandated services. There are opportunities for NMS to generate revenue through implementing a charging policy targeting sectors such as building/construction, tourism, and other private companies. This will facilitate national climate funding, and may include cost-recovery mechanisms from sectors, where feasible.

## 9 Monitoring, evaluation, and reporting

### 9.1 Monitoring

A Monitoring and evaluation process needs to be in place to assess the delivery of the expected outputs and outcomes, and to apply correction measures when warranted. This process also allows flexibility and opportunity to reevaluate the goals and objectives so that NFWCOS can be relevant for next 5 years.

**Table 12: Performance Measurement Framework for NFWCOS**

**Goal 1: Strengthen Niue Meteorological Services' ability and infrastructure to provide improved, robust and undisrupted national weather, climate including climate change and ocean services and warnings to meet national to community level user needs**

<sup>11</sup> Funded by the Australian Government

Outcomes	Indicators	Baseline	Targets	Data Sources	Data Collection Methods	Frequency	Responsibility
NMS is well equipped and has the capacity and knowledge to provide required national weather, climate and ocean services for Niue	New or upgraded NMS building at Hanan Airport	Current building	Fully operational new or upgraded Met Office	Department reports, Project reports, NCC Meeting reports	Department /Project /NCC meetings	Annually	MNR TB
	Increased number NMS staff with appropriate skills and training in weather, climate and ocean services	Current baseline	All positions filled in, and all staff undergone appropriate training	Department reports	Department meetings	Six-monthly	NMS MNR
	New and improved water, climate and ocean products and services tailored to meet users' needs.	NMS issues Climate Summary and Climate Outlook bulletins, there is no Ocean Bulletin, and MHEWS and CLEWS in place	Ocean services in place, enhanced climate services in place, NMS producing tailored climate and ocean bulletins, MHEWS and CLEWS fully established	Published bulletins, new data and products	Surveys, user interviews, social media posts, Department meetings, NCC meetings	Six-monthly	NMS NCC
	NMS continuously abreast with emerging climate change projections and related information on global and regional platforms.	Current status	NMS co-partnering and co-authoring research and technical climate change papers, and NMS participating in IPCC, COP meetings	Ministerial briefs, Department reports, published Research and Technical papers	Department and Ministerial meetings	Yearly	MNR NMS
	National climate change policies and plans are well informed and widely consulted.	Current status	NMS contributing to all relevant national climate change strategic and policy documents	Ministerial reports, Department reports, Climate Change Plans and Policies	Department meetings	Yearly	NMS
<b>Goal 2: Strengthen Niue Meteorological Services' partnership and coordination with the ministries and departments, national sectoral agencies, private sectors and communities to improve service delivery, increase the effectiveness and proper use of meteorological, ocean, climate products and services</b>							
Ministries and departments, national sectoral agencies, private sectors, and communities are proactively partnering and collaborating with NMS on weather, climate and ocean service delivery and usage	Increased share of NMS from the Government annual budget allocation.	Current budget	Niue Government approved budget	Ministerial budget report		Annually	MNR TB
	Ministries and departments, national sectoral agencies, private sectors, and communities consulting NMS' on weather, climate and	Current status	NMS has MoUs or a formal agreement with all or most key agencies	Department reports, meeting reports	Department meetings	Annually	MNR NMS

	ocean products and services.						
	Active platform or communication channels in place for sharing and weather, climate and ocean information and seeking feedback.	Ad-hoc workshops and meetings, including project funded events, community events	Regular NCOF and community level workshops/meetings	NCOF reports, meeting reports, workshop reports	Department meetings Surveys	Six-monthly to yearly	NMS NCC
	Funds are allocated when appropriate triggers are met, associated with severe weather and climate warnings.	Nil	A fully tested FbF system embedded in disaster mitigation and response plan	NDMO report, DRR plans	NCC meetings	Six-monthly	NMS NDMO NCC
<b>Goal 3: Enhance understanding and usage of weather, climate including climate change and ocean products and services and warnings by key stakeholders including government, private sectors, FBOs, CSOs, NGOs and village communities</b>							
National to community level stakeholders are able to understand and use NMS' weather, climate and ocean products and information	Increased number of the users (including departments, national sectoral agencies, private sectors, FBOs, CSOs, NGOs and village communities) understand NMS' weather, climate and ocean products and information.	20 to 30%	At least 70% of the users understand NMS' weather, climate and ocean products and information	Survey reports, Workshop reports	Surveys, workshops	Annually	NMS
	There is an increases number of departments, national sectoral agencies, private sectors, FBOs, CSOs, NGOs and village communities using NMS' weather, climate and ocean products and information for decision-making in their respective sector.	Less than 20%	More than 50% of the users utilise NMS' weather, climate and ocean products and information	Survey reports, Workshop reports	Surveys, workshops	Annually	NMS
<b>Goal 4: Improve and maintain the meteorological, climate and ocean observation network and data collection across Niue</b>							
Niue has access to high quality meteorological, climate and ocean database across the country	Fully operational AWSs in Vaipapahi and Liku.	Only Hanan Airport has an AWS	At least 3 met observation sites in Niue	Data feed from AWSs	Site data report	Six-monthly	NMS NCC
	Fully operational wave buoy off the Niue coast.	Nil	At least 1 wave buoy in Niue	Data fed from the wave buoy	Site data report	Six-monthly	NMS NCC
	Fully operational AWOS at Hanan Airport	Nil	At least 1 AWOS at the airport	Data feed from AWOS	Site data report	Six-monthly	NMS NCC

	Up to date climate database in place at NMS	All Climate data for Hanan Airport. And other locations have not been digitised	All data from all stations are in CiDE and automatic data ingestion from all AWS is fully operational	Data Inventory report	CiDE report	Six-monthly	NMS NCC
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## 9.2 Evaluation

The evaluation of the Framework may be conducted in 2<sup>nd</sup> year and 4<sup>th</sup> year either through internal process or by external independent personnel. Since many of the activities will be funded and supported by a few current or planned projects, the implementing or the donor agencies will conduct project evaluation assessment. The NCC may conduct separate evaluation of the Framework implementation.

## 9.3 Reporting

The National Coordinating Committee (also delegated as the NFWCOS Committee) will submit formal six-monthly and yearly progress and status reports to the Minister and PMCU either via email or printed version. Reports will be made available to development partners as per their requirements.

## Annexes

Annex 1: The Stakeholder Consultation Workshop, Alofi, Niue, 24<sup>th</sup> – 25<sup>th</sup> May 2023

Annex 2: Niue Climate Summary for Year 2022

Annex 4: Niue Climate Outlook August 2023