

# Funding Proposal

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## **FP035: Climate Information Services for Resilient Development in Vanuatu**

Vanuatu | Secretariat of the Pacific Regional Environment Programme (SPREP) | Decision B.15/24

24 November 2016





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# Funding Proposal

Version 1.1

**The Green Climate Fund (GCF) is seeking high-quality funding proposals.**

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: **Climate Information Services for Resilient Development in Vanuatu (Van CIS RDP)**

Country/Region: Vanuatu/Pacific SIDS

Accredited Entity: SPREP

Date of Submission: \_\_\_\_\_

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### *Note to accredited entities on the use of the funding proposal template*

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

**Please submit the completed form to:**

[fundingproposal@gcfund.org](mailto:fundingproposal@gcfund.org)

Please use the following name convention for the file name:

“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

A.1. Brief Project / Programme Information	
A.1.1. Project / programme title	Climate Information Services for Resilient Development Planning in Vanuatu (Van-CIS-RDP);
A.1.2. Project or programme	Project <sup>1</sup>
A.1.3. Country (ies) / region	Vanuatu
A.1.4. National designated authority (ies)	Mr. Jesse Benjamin Director General Ministry of Climate Change, Meteorology, GeoHazards, Environment, Energy and Disaster Management, Vanuatu
A.1.5. Accredited entity	Secretariat of the Pacific Regional Environment Programme (SPREP)
A.1.5.a. Access modality	<input checked="" type="checkbox"/> Direct <input type="checkbox"/> International
A.1.6. Executing entity / beneficiary	<p><u>Executing Entities:</u></p> <ul style="list-style-type: none"> <li>• SPREP;</li> <li>• Government of Vanuatu through the Vanuatu Meteorological &amp; Geohazard Department (VMGD)</li> </ul> <p><u>National beneficiaries in Vanuatu</u></p> <ul style="list-style-type: none"> <li>• Vanuatu National Advisory Board</li> <li>• Ministry of Climate Change</li> <li>• Vanuatu Meteorology &amp; Geohazard Department</li> <li>• Vanuatu National Disaster Management Office and other National Government Departments relevant to designated priority sectors: <b>Water; Agriculture; Fisheries; Infrastructure; Tourism;</b></li> <li>• Provincial Governments: Malampa; Penama; Sanma; Shefa; Torba</li> <li>• Provincial agencies, research stations, extension specialists and other intermediaries</li> <li>• Vanuatu Community Resilience Working Group</li> <li>• Vanuatu Association of NGOs (VANGO)</li> <li>• Local Community Councils and community-based school, church, women’s and youth groups</li> <li>• Private sector including SME service providers for priority sectors</li> <li>• Other development partners, incl:</li> </ul>

<sup>1</sup> It is anticipated that this will be the first (sub) project as part of a phased multi-country programme to be developed by SPREP and partners. Further information on this is provide in section C3

		<ul style="list-style-type: none"> <li>○ Other international donors &amp; NGOs</li> <li>○ Multi-lateral Development Banks (incl. ADB &amp; World Bank)</li> <li>○ Other international research providers and technical experts</li> </ul> <p>The project will also have direct and indirect benefits for other PICs including through development of regionally relevant resources, for which it is intended SPREP will replicate for use in additional PICs, including via CIS projects developed for the GCF.</p>
A.1.7. Project size category (Total investment, million USD)		<input type="checkbox"/> Micro ( $\leq 10$ ) <input type="checkbox"/> Medium ( $50 < x \leq 250$ ) <input checked="" type="checkbox"/> Small ( $10 < x \leq 50$ ) <input type="checkbox"/> Large ( $> 250$ )
A.1.8. Mitigation / adaptation focus		<input type="checkbox"/> Mitigation <input checked="" type="checkbox"/> Adaptation <input type="checkbox"/> Cross-cutting
A.1.9. Date of submission		September 2016
A.1.10. Project contact details	Contact person, position	Dr Netatua Pelesikoti, Director, Climate Change Division (CCD)
	Organization	SPREP
	Email address	<a href="mailto:netatuap@sprep.org">netatuap@sprep.org</a>
	Telephone number	+685-21-929
	Mailing address	SPREP, PO Box 240, Apia, Samoa

A.1.11. Results areas <i>(mark all that apply)</i>	
<b>Reduced emissions from:</b>	
<input type="checkbox"/>	Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
<input type="checkbox"/>	Low emission transport (E.g. high-speed rail, rapid bus system, etc.)
<input type="checkbox"/>	Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
<input type="checkbox"/>	Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)
<b>Increased resilience of:</b>	
<input checked="" type="checkbox"/>	Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
<input checked="" type="checkbox"/>	Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation systems, etc.)
<input checked="" type="checkbox"/>	Infrastructure and built environment (E.g. sea walls, resilient road networks, etc.)
<input checked="" type="checkbox"/>	Ecosystem and ecosystem services (E.g. ecosystem conservation and management, ecotourism, etc.)

## A.2. Project / Programme Executive Summary (max 300 words)

Vanuatu is among the most vulnerable countries on earth to the increasing impacts of climate change, including climate-related natural disasters and the effects of slow-onset events such as sea-level rise and ocean acidification.

As the effects of global warming manifest and the hazards of climate change arise at accelerating rates, there is a need to shift the paradigm towards the standardized and mainstreamed use of science based climate information, at multiple timescales, to support resilient development pathways. The proposed project will support this paradigm shift through the strengthening and application of Climate Information Services in five targeted development sectors: tourism; agriculture; infrastructure; water and fisheries.

More specifically, the project will build the technical capacity in Vanuatu to harness and manage climate data; develop and deliver practical CIS tools and resources; support enhanced coordination and dissemination of tailored information; enhance CIS information and technology infrastructure; and support the application of relevant CIS through real-time development processes, for more resilient outcomes.

The project has a focus on addressing information gaps and priority needs of target beneficiaries at national, provincial and local community levels across the five priority sectors<sup>2</sup>.

The project has been developed on the basis of the *Vanuatu Framework for Metrological Services* (and the *Global Framework for Metrological Services*) and validated including through a series of in-country consultations at national, provincial and sectorial levels.

The project will deliver:

- Enhanced capacity and capability of national development agents, to understand, access and apply CIS
- Enhanced CIS communications, knowledge products, tools, and resources for practical application to development processes.
- Enhanced reliability, functionality, utility and timeliness of underlying CIS delivery systems and data collection infrastructure.
- Enhanced scientific data, information and knowledge of past, present and future climate to facilitate innovated and resilient development

The project is expected to directly enhance the resilience of 60% of the population of Vanuatu, with 30% of the population benefitting directly through delivery of the project activities

## A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	N/A (Please see attached letter of approval from the SPREP Director General).
Expected financial close (if applicable)	NA
Estimated implementation start and end date	Start: <u>01/04/2017</u> End: <u>30/06/2021</u>
Project/programme lifespan	4 years 3 months

<sup>2</sup> SPREP intends to replicate similar (CIS RDP) approaches in additional PICs within a GCF Programme, to leverage regional efficiencies and other benefits.

## B.1. Description of Financial Elements of the Project / Programme

The GCF grant request is needed to provide this critical public good, which no other financing institution, private company, or donor is currently able, or is as well positioned to do as the GCF. There is currently no substantial market demand for CIS, including due to lack of awareness, capacity, and understanding of CIS financial viability. Donor and bi-lateral support is also currently not available. Furthermore the proposed activities and outcomes are very well aligned with the objectives of the GCF. The case for investment in CIS, as a high return public good supporting resilient development is made throughout the proposal, with some analysis suggesting an estimated benefit-cost ratio conservatively of 5.3:1, with an EIRR of 68%. Delivery of a public good of this nature can have difficulties in leveraging public and private finance, though the project, through regional partnership arrangements will leverage in-kind cofinancing support of around 16% of the total grant request.

*Table 1 – Budget Overview ( a detailed budget breakdown is provided as an Annex)*

Component	Sub-component	Amount (for entire project)	Currency	Amount (for entire project)	Local currency <sup>3</sup>	GCF funding amount	Currency of disbursement to recipient
1.0 Capacity Development	1.1	0.2	million USD (\$)	21.210	Million VUV \$	0.164	million USD (\$)
	1.2	1.5	million USD (\$)	159.075	Million VUV \$	1.36	million USD (\$)
	1.3	0.2	million USD (\$)	21.210	Million VUV \$	0.164	million USD (\$)
	1.4	0.35	million USD (\$)	37.118	Million VUV \$	0.35	million USD (\$)
	1.5	0.35	million USD (\$)	37.118	Million VUV \$	0.35	million USD (\$)
	1.6	0.27	million USD (\$)	28.634	Million VUV \$	0.22	million USD (\$)
	1.7	0.500	million USD (\$)	53.025	Million VUV \$	0.500	million USD (\$)
2.0 User interface Platform	2.1	0.735	million USD (\$)	77.947	Million VUV \$	0.635	million USD (\$)
	2.2	0.275	million USD (\$)	29.164	Million VUV \$	0.225	million USD (\$)

<sup>3</sup> Currency conversion date 17/10/2016 @ 1USD : 106.050VUV (www.xe.com)

3.0 Climate Information Services System	3.1	0.475	<u>million USD</u> (\$)	50.374	Million VUV \$	0.435	million USD (\$)
	3.2	0.435	<u>million USD</u> (\$)	46.132	Million VUV \$	0.355	million USD (\$)
	3.3	0.220	<u>million USD</u> (\$)	23.331	Million VUV \$	0.180	million USD (\$)
	3.4	1.050	<u>million USD</u> (\$)	111.353	Million VUV \$	0.950	million USD (\$)
	3.5	0.400	<u>million USD</u> (\$)	42.420	Million VUV \$	0.355	million USD (\$)
	3.6	0.350	<u>million USD</u> (\$)	37.118	Million VUV \$	0.305	million USD (\$)
4.0 Observation and Monitoring	4.1	0.250	<u>million USD</u> (\$)	26.513	Million VUV \$	0.210	million USD (\$)
	4.2	1.325	<u>million USD</u> (\$)	140.516	Million VUV \$	1.145	million USD (\$)
	4.3	1.0	<u>million USD</u> (\$)	106.050	Million VUV \$	0.955	million USD (\$)
	4.4	0.750	<u>million USD</u> (\$)	79.538	Million VUV \$	0.665	million USD (\$)
	4.5	6.550	<u>million USD</u> (\$)	694.628	Million VUV \$	6.55	million USD (\$)
5.0 Research Modelling and Prediction	5.1	0.220	<u>million USD</u> (\$)	23.331	Million VUV \$	0.180	million USD (\$)
	5.2	1.025	<u>million USD</u> (\$)	108.701	Million VUV \$	0.835	million USD (\$)
	5.3	1.025	<u>million USD</u> (\$)	108.701	Million VUV \$	0.835	million USD (\$)
	5.4	0.750	<u>million USD</u> (\$)	79.538	Million VUV \$	0.610	million USD (\$)
	5.5	0.750	<u>million USD</u> (\$)	79.538	Million VUV \$	0.610	million USD (\$)



	5.6	0.750	<u>million USD</u> (\$)	79.538	Million VUV \$	0.610	million USD (\$)
	5.7	0.750	<u>million USD</u> (\$)	79.538	Million VUV \$	0.610	million USD (\$)
	5.8	0.480	<u>million USD</u> (\$)	50.904	Million VUV \$	0.390	million USD (\$)
6.0 Project Management and Governance	6.1 & 6.2	3.700	<u>million USD</u> (\$)	392.385	Million VUV \$	2.20	million USD (\$)
<b>Total project financing</b>		<b>26.635</b>	<b><u>million USD</u></b> <b>(\$)</b>	<b>2824.648</b>	<b>Million VUV</b> <b>\$</b>	<b>22.953</b>	<b>million USD (\$)</b>

*\* Please expand the table if needed.*

## B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
<b>(a) Total project financing</b>	<b>(a) = (b) + (c)</b>	26.635	<u>million USD</u> (\$)		
<b>(b) GCF financing to recipient</b>	(i) Senior Loans	.....	<u>million USD</u> (\$)	() years	( ) % IRR
	(ii) Subordinated Loans	.....			
	(iii) Equity	.....			
	(iv) Guarantees	.....			
	(v) Reimbursable grants *	.....			
	(vi) Grants *	22.953			
* Please provide economic and financial justification in <a href="#">section F.1</a> for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in <a href="#">section E</a> .					
	<b>Total requested (i+ii+iii+iv+v+vi)</b>	<b>22.953</b>	<b><u>million USD</u></b> <b>(\$)</b>		

	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
(c) Co-financing to recipient	<u>Grant</u>	1.5	<u>million USD</u> (\$)	VMGD	( ) years	( ) %	<u>Options</u>
		2.182	<u>million USD</u> (\$)	Delivery Partners	( ) years	( ) % IRR	<u>Options</u>
	Lead financing institution:						
* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.							
<b>B.3. Financial Markets Overview (if applicable)</b>							
N/A							

Please fill out applicable sub-sections and provide additional information if necessary, as these requirements may vary depending on the nature of the project / programme.

### C.1. Strategic Context

*Please describe relevant national, sub-national, regional, global, political, and/or economic factors that help to contextualize the proposal, including existing national and sector policies and strategies.*

This project proposal has been designed in response to the Climate Information Service (CIS) needs of Vanuatu, as a critical element in its response to the immediate, seasonal, and long term impacts of climate change. For this project CIS services can be thought of as involving “... the generation, provision and contextualization of information and knowledge derived from climate research for decision-making at all levels of society....mainly targeted at informing adaptation to climate variability and change...”, and providing ‘...people and organisations with timely, tailored climate-related knowledge and information that they can use to reduce climate-related losses and enhance benefits, including the protection of lives, livelihoods and property....’ (Vaughan and Dessai (2014))

#### **International context**

At the United Nations Sustainable Development Summit in 2015, the 2030 Agenda for Sustainable Development featuring a set of 17 Sustainable Development Goals (SDGs), was adopted by world leaders (UN 2015). Goal 13 (*...Take urgent action to combat climate change and its impacts*” ....) makes specific reference (amongst others) to the vulnerability of small island developing states (SIDS) and the need to “....*strengthen resilience and adaptive capacity to climate related hazards and natural disasters...*”

The recently announced Paris Agreement (UNFCCC COP 21, 2015) specifically states (Article 7/Item 7a-c) “...*Parties should strengthen their cooperation on enhancing action on adaptation, taking into account the Cancun Adaptation Framework, including in regard to:*

- *Sharing information, good practices, experiences and lessons learned, including as appropriate, as these relate to science, planning, policies and implementation in relation to adaptation actions*
- *Strengthening institutional arrangements...to support the synthesis of relevant information and knowledge, and the provision of technical support and guidance to Parties; Strengthening scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and supports decision-making...*”

Related considerations for decision-making for climate related disaster risk reduction purposes are addressed by the Sendai Framework for Disaster Risk reduction 2015-2030 (UNISDR 2015)

The Global Framework for Climate Services (GFCS) (WMO 2014) is designed in large part to provide the conceptual framework for society to “...*better manage the risks and opportunities arising from climate variability and change, especially those who are most vulnerable to climate-related hazards*”. The GFCS goes on to state that “...***This will be done through developing and incorporating science-based climate information and prediction into planning, policy and practice***”. The expected GFCS long-term high-level outcomes and benefits

include “...that user communities make climate-smart decisions and that climate information is disseminated effectively and in a manner that lends itself easily more easily to practical action”. Along with national level, and aligned strategies, the GFCS serves as the guiding framework for this proposal.

The World Bank Group, estimates that globally improved weather, climate and water observation and forecasting could lead to up to US\$30b/annum in increases in global productivity and up to US\$2b/annum in reduced asset losses (WMO, 2015). However, reliable, more extensive analyses have not been undertaken to date in the western tropical Pacific, or indeed in SIDS more generally – something that this proposal seeks to address (in part) through application of a fit-for-purpose Cost Benefit Framework (see Section C2 and Annexed CBA Framework for details), which has been developed with support of a GCF Readiness grant.

### **Pacific regional climate perspective**

According to *Climate Variability, Extremes and Change in the Western Tropical Pacific: New Science and Updated Country Reports* (CSIRO and Bureau of Meteorology 2014) and *Climate in the Pacific: A Regional Summary of New Science and Management Tools* (CSIRO, Bureau of Meteorology and SPREP 2015), key climate risks for the region generally include increasing air and sea surface temperature, increasing sea levels, changes in frequency and intensity of tropical cyclones, extreme rainfall, drought, temperature and sea level events, and increasing ocean acidification and coral bleaching. These risks are compounded by the interdependencies of large-scale climate processes in the Pacific such as the South Pacific Convergence Zone (SPCZ), the Intertropical Convergence Zone (ITCZ) and the Western Pacific Monsoon (see below) and the extreme cycles (El Nino and La Nina) of the El Nino Southern Oscillation (ENSO); all of which are now further compounded by the increasing global effects of climate change in the region.

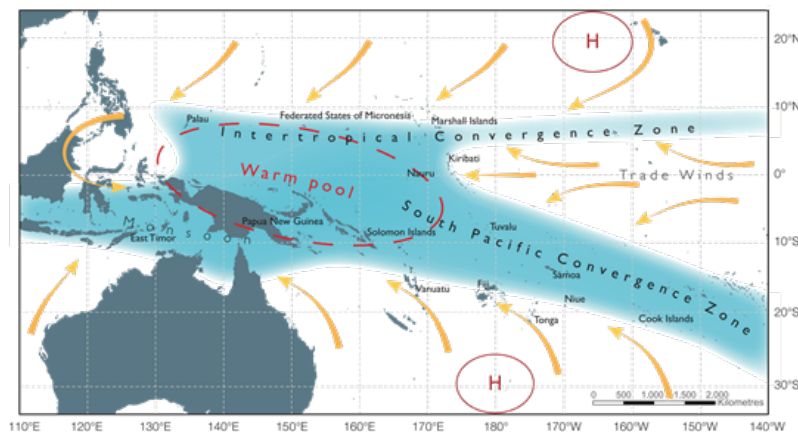


Figure 1: Depiction of the SPCZ

### **Vanuatu country context**

Vanuatu (pop: 277,554) in particular is one of the most vulnerable countries in the Pacific and SIDS more generally at a global level. Of particular note is its location in the ‘warm pool’ of the SPCZ which means it is highly exposed to cyclone activity.

The landscape is characterized by 5 island groups, of mostly mountainous volcanic origin; steep catchments leading narrow coastal plains vulnerable to flooding. It has a tropical climate tropical; moderated by southeast trade winds from May to October; moderate rainfall from November to April often affected by cyclones from December to April. Vanuatu's population is concentrated along the coastal environment that plays a vital role in the subsistence and commercial life of Ni-Vanuatu. Increased human activity in this coastal environment is placing greater pressure on sensitive areas such as beaches, coral reefs and mangroves. Atolls, low-lying islands, and low-lying coastal areas of Vanuatu are particularly vulnerable to climate change consequences

As one of the most highly exposed countries in the world to disaster risks<sup>4</sup>. Vanuatu is vulnerable to a range of climate variability, storm surge, landslides, and droughts and flooding. Some of these climate related risks include the following:

- by 2040, daily temperatures will increase from 1995 levels by 1.2°C;
- sea level rise will continue and accelerate thus risks of coastal inundation will be high when combined with storm surges and high seas;
- ocean acidification may degrade 80% of coral reefs within 20 years;
- extreme temperatures will reach higher levels and become more frequent;
- extreme weather events, including cyclones and storms, will increase in intensity but not necessarily in frequency; dry periods will last longer; and extreme rainfall will be more frequent and intense thus Vanuatu will be susceptible to erosion and flooding due to expected periods of intense rainfall.

The economy is based primarily on small-scale agriculture, which provides a living for about two-thirds of the population (and is a particular source of income and livelihood for women). Fishing, offshore financial services, and tourism, with nearly 197,000 visitors in 2008, are other mainstays of the economy. Most of the population does not have access to a reliable supply of potable water, though 94.5% has access to 'improved' water sources, and deforestation exists as a major environmental challenge.

The main climate change hazards for Vanuatu include tropical cyclones (with high winds and wave energy, heavy rain flooding, extended periods without rain causing drought, rising sea levels threatening coastal environments and property, as well as sea temperature increase and ocean acidification putting pressure on highly valuable coastal ecosystems and resources (including coral reefs, fisheries and impacts on livelihoods and tourism). Pacific region adaptation costs across all vulnerable sectors are estimated to be in the order of \$158 to 775m per annum until 2050 to prepare for best-worst case scenarios (with \$447m under business-as-usual) (ADB 2013).

To address existing climate impacts, and to prepare for predicted increases in climate change and disaster risks Vanuatu has prioritized the development of institutional frameworks and build capacity which support practical application of long-term 'climate smart' (climate mainstreamed, climate sensitive) policy and planning. These frameworks, policies and plans in turn will need to be informed by comprehensive, consistent, timely, cost-effective and scientifically robust, evidence-based decision-making by multiple stakeholders. Such

<sup>4</sup> The World Risk Report 2012 was published by Alliance Development Works (Bündnis Entwicklung Hilft) in collaboration with the United Nations University Institute for Environment and Human Security and The Nature Conservancy

approaches will need to consider multiple spatial (national to local community level) and temporal (sub-seasonal and seasonal to multi-decadal i.e. weather to climate) scales in order to achieve sustainable, climate resilient adaptation, disaster risk reduction and associated development outcomes for all stakeholders.

### **Vanuatu Framework for Climate Services**

For Vanuatu specifically, the strategic vision, principals, goals and priorities for climate change and disaster risk reduction policy and planning are provided by the ***Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030 (SPC 2015)***. This policy sets the framework for mainstreaming climate change and disaster risk reduction into sustainable development processes for Vanuatu. The policy identifies the joint/integrated governance role of the *National Advisory Board (NAB) on Climate Change and Disaster Risk Reduction* and the VMGD for purposes of implementing the policy, along with sectoral capability such as the *Ministry of Agriculture Risk and Resilience Unit*.

This policy effectively replace all previous climate adaptation plans and strategies, including the previous (2006) Vanuatu National Adaptation Plan of Action and subsequent draft climate change strategies in 2007 and 2011, with a new National Adaptation Plan now being proposed. The policy identifies key climate change impacts for Vanuatu as including (amongst others):

- reduced availability of freshwater
- shifts in crop seasonality of harvest, planting and fruiting
- more pests and diseases of animals, crops and trees
- saltwater inundation and intrusion of coastal land and groundwater
- compromised food security
- coral reef deterioration
- reduced fisheries productivity
- increased risk of human disease and health problems, including vector-borne disease and heat stress
- damage to infrastructure
- loss of coastal land, and
- reduced economic growth and revenue generation

This impacts align directly with the five priority sectors in Vanuatu targeted by this project proposal as detailed elsewhere in this document.

Strategic priorities for addressing these impacts and implementing the national policy relevant to this project proposal include (amongst others) to:

- Establish and strengthen institutional structures to effectively undertake their functions (including developing capacity and enhancing coordination mechanisms at all levels of government, private sector and community)
- Drive strategic decision-making through contemporary legislation and policy frameworks
- Meet international climate change and disaster risk reduction obligations

- Develop and implement strategic and business plans integrating risk
- Integrate M&E into project and programme design across government agencies and stakeholder groups
- Strengthen existing systems to improve information capture, access and application
- Build on and share existing traditional knowledge and expand its use
- Enhance data analysis and strengthen research activity and capacity
- Strengthen risk assessment processes and address site-specific climate and disaster vulnerabilities

The policy also identifies the need to address cross-cutting issues with emphasis on the importance of capacity building, gender and social inclusion, multi-hazard approaches, mainstreaming and partnerships.

The **Vanuatu Meteorology and Geo-Hazards Department *Strategic Development Plan 2014-23*** (VMGD 2014) sets the strategic context and direction for strengthening the capacity of the VMGD, with emphasis on developing and supporting “...state of the art technical services...” collectively through enhanced capacity, coordination and partnerships. The Strategy focuses on the following priorities (amongst others):

- Improved weather, climate and climate change services (including across multiple hazards, stakeholders and time frames)
- Improved observations and associated monitoring networks, and
- Enhanced capacity for both administrative/project management and research and development, outreach and communications.

The Strategy summarises the current situation (capacity, activities, products and services) for the relevant Divisions of the VMGD including Weather Forecasting and Services, Climate, Climate Change and Disaster Risk Reduction, Observations, and Information Communications Technology and Engineering.

The **Vanuatu Framework for Climate Services (VFCS)** (SPREP 2016) is principally guided by the five pillars of the GFCS, the VMGD Strategic Development Plan and by various national level stakeholder consultations. The stated goal of the VFCS is to “...ensure climate services for Vanuatu are of world-class standard, sustainable, are reaching all end-users, and are effectively helping people manage and adapt to climate variability and change in Vanuatu (SPREP 2016). This Framework identifies the most pressing needs as:

- The development, through key stakeholder consultation, of tailored climate products (including training on their use), and
- Improvements to and formalization of mechanisms for communicating and disseminating climate information

The Framework makes 18 specific recommendations, based around the five pillars and associated structure of the GFCS, as priority actions to be implemented as part of a Vanuatu Climate Services Roadmap designed to strengthen climate information development, provision, understanding and use throughout Vanuatu. The Framework, in combination with priorities of the VMGD Strategic Development Plan variously refer to aspects of:

- Capacity of both providers and receivers (source and Next/End-Users) of climate services
- The interface platforms and networks used for dissemination of climate information on its value
- The kind of products that can be produced and tailored to user needs
- The research gaps that still require filling, and
- The requirement for high quality climate observations fundamental to all services

These vulnerabilities and priorities have been further elaborated and verified through, in-country consultations<sup>5</sup> held with national, provincial and sectoral, and non-government stakeholders to identify and verify their climate vulnerabilities and corresponding Clime Information Service needs. This is elaborated on in Section C2 below.

## C.2. Project / Programme Objective against Baseline

Vanuatu, as with other small island developing states, faces many environmental and economic challenges to sustainable development as a result of small land masses, remote locations and small but rapidly growing populations making them particularly vulnerable. This is compounded by the limited social and economic capital and human resources. This has been described in Section 1 above.

This project aims to address key climate change vulnerabilities and support climate resilient development through the delivery of tailored CIS, with a focus on 5 priority development sectors. Effective delivery will require that key barriers to uptake are addressed and that CIS products and services are relevant, practical. The baseline described below provides the basis and rationale for the CIS activities described in Section 3 below, and the project more broadly. The baseline has been established through analysis of existing information, as well as consultation with national, provincial and sectoral, and non-government based stakeholders, as per the GCF supported Activity Area 4 Readiness Grant. Further detail of the baseline, and the consultations undertaken can be found as an Annex to this proposal. The project has the support of each of the 5 sector related ministries (see Annexed letters of support)

### **Overview of Key Barriers and Challenges**

Although aspirations for a resilient country are highlighted in national, sectoral policies and strategies, there is a lack of clear and practical guidance (and capacity support) on how to apply CIS as a basis for climate resilient development through decision making at policy / planning national / community and household levels

There is an implicit understanding that decision making for sustainable and resilient information would be informed by the best available information and capacity, however targeted application of climate change and disaster risks information into decision making processes is still fairly 'new' for sectors and communities. This is not a challenge unique to Vanuatu.

In Vanuatu, one of the primary challenge is establishing clear pathways for the flow of climate knowledge and information from the VMGD for used by sectors and communities. If this is not addressed, maladaptation is a real risk, including in terms of economic, environmental and livelihood costs.

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<sup>5</sup> As support by the GCF Activity Area 4 Readiness Grant.



There is a tradition of using and relying on existing local or tradition knowledge but due to socio-economic pressures such as population growth and demands, coupled with changing and increasing intensity and frequency of extreme events, currently local knowledge may no longer be sufficient to ensure resilient development.

Further, a significant body of robust science-based climate knowledge exists regionally and within the VMGD, however it is underutilized in practice for various reasons including difficulty in applying information to user needs, insufficient training and experience for accessing and using products and services, and lack of opportunity for skilled personnel to develop/improve customised CIS and to engage routinely with sectoral end-users. In this context, on-the-ground requirements need to be specifically addressed and improved.

Adaptation and resilient development policy, planning and implementation is, therefore, not properly informed by the right information. In this context, root causes of vulnerability are not identified, which can lead to unsustainable development and mal-adaptation. Project/programme outcomes are often not achieved and both donors and beneficiary countries/communities loss faith in development interventions. This is a serious challenge that most development projects try to circumvent, as it may seem costly and time consuming to adopt and apply, and often CIS is disregarded and current perception and views are used instead, as a proxy. In this context, this project intends a major shift both in paradigm and in practice that Vanuatu has the capacity for confidently apply CIS in adaptation and resilient planning and implementation.

National Adaptation Programs of Action (NAPAs) in the Pacific have highlighted that awareness and education on the implications of climate change, weather and climate on communities were critical steps in adapting to climate change. While communities are familiar with current weather, there is less appreciation of the impending changes in long-term climate. Understanding of the range of possible future changes, including associated uncertainties, is critical for planning and adjusting local practices, processes, systems and infrastructure, which at present in many Pacific Island countries including Vanuatu are more suited to manage extant climate variability. There is currently no systematic and coherent understanding of the slow-onset but longer-term changes in climate and their likely implications on diverse communities and social groups. The absence of coherence in perceptions of change and what needs to be done to manage uncertainties is a recipe for undermining resilience to climate change and adaptive capacity and therefore human development. Systematic efforts to inform and prepare the public to adapt and manage expected changes have not been undertaken as yet. Comprehensive and sustainable awareness raising programmes have not been designed and therefore not implemented. The main barriers being that resources for implementing comprehensive programmes of support have not been available through other existing sources (e.g. public funds) due to competing needs for scarce resources.

### **Baseline of CIS in Vanuatu**

The Australian Government-funded PCCSP/PACCSAP and COSPPac programmes have provided capacity building to Pacific Meteorological Agencies including Vanuatu, along with other regional climate programmes including FINPac and RoK-PI-CLIPs. Assistance provided included creation of information and knowledge on regional and country specific climate projections, seasonal forecasting and understanding of climate variability and extremes.

However for these to be applied in practice they need to be operationalised in the form of tailored CIS for specific, real-time in-country sectoral applications in collaboration with end-users at national and sub-national level, at the same time as building the capacity of these end-users to routinely apply such CIS in decision making. This is the intended purpose of this project.

Currently environmental and climate change considerations are only being effectively integrated into community development programmes in a few scattered projects. (e.g. Vanuatu Coastal Adaptation Plan: V-CAP). The V-CAP climate adaptation project is working to build resilience through improved infrastructure, sustained livelihoods, and increased food production. These efforts are working to improve the quality of life in targeted vulnerable areas in the coastal zone of Vanuatu. Accordingly, the V-CAP project may be a suitable candidate for establishing a CIS-based case study as part of the national Van-CIS-RDP project in Vanuatu.

### ***Current CIS (incl. meteorological and hydrological services)***

VMGD is responsible for the collection, quality control, processing, storage and retrieval of meteorological and climatological data so that it may be utilized by a wide variety of stakeholders. One of its primary responsibilities is the preparation and publication of seasonal climate forecasts and long-term climate change predictions. VMGD provides technical expertise to the National Disaster Management Office (NDMO) and various climate-sensitive sectors during ENSO events, and disseminates advisories on significant climate events such as El Nino and La Nina. It also pursues climate variability and climate change research in support of national development strategies. In addition, VMGD has an active focus on community engagement, which includes raising awareness of its climate information and services, and how these might be utilised by various end-users (SPREP 2016).

The Climate Division's growth in service in recent years has been driven by the increasing demand of end users for climate specific information, and the resultant capacity built around the new services it has developed. The scope for more climate services continues to grow as the Division grows its information baseline of the needs of end users, and the methodologies and tools available to it to develop more nuanced consultations, particularly with vulnerable rural community groups. While the Vanuatu government has rightly placed a lot of emphasis historically on climate change adaptation, it will also need to focus specific attention to climate science, and research and development, to better inform climate change adaptation and disaster risk reduction and management. Rationale and associated priority gaps and needs for future CIS delivery are collectively outlined in the Vanuatu Framework for Climate Services and the VMGD Strategic Plan as discussed in Section C.1 of this proposal, and in the GCF Readiness Project draft Synthesis Report (annexed).

### ***VMGD technical infrastructure***

Doppler radar is a critical component of observational networks and associated weather forecast and warning systems for national meteorological departments around the world. More specifically this technology provides real-time, high resolution visualised weather data on forecast scales of hours to days at various spatial scales (from sub-regional to national/sub-national) depending on technical design and operational specifications. Accordingly,

such data are critical to informing reliable and accurate Climate Early Warning Systems (CLEWS) for vulnerable partner PICs in the western tropical Pacific.

Existing VMGD weather, climate and geo-hazard data collection infrastructure assets include five manual weather observation stations, two automatic weather stations (AWS), a Himawari Cast satellite imagery receiving system, two tide gauges, seven seismic stations and 19 warning siren systems. This infrastructure currently supports the department in collecting data for issuing meteorological and geological forecasts and associated hazard warning to the people of Vanuatu across the expansive Y shaped archipelago consisting of 83 islands. This infrastructure is not however considered adequate to provide national coverage of real-time, high resolution data to inform CIS-based CLEWS during severe weather events such as tropical depressions/cyclone resulting in extreme wind and rain, and associated extreme sea level events (storm surge and coastal inundation).

In the *Post-Tropical Cyclone Pam Expert Mission to Vanuatu* Report, and the *TC Pam* PDNA report, the need for VMGD to strengthen early warning systems for climate hazards such as tropical cyclones was recognised; in particular the installation of weather radar capability. Existing weather radar capability for Vanuatu is limited to coverage in the northern part of the archipelago from radar installation located and operated in New Caledonia, however this system is insufficient to meet existing and emerging CIS needs for comprehensively informing multi-hazard CLEWS across the country.

Radar would provide sufficient coverage over the southern part of Vanuatu, including major population centres in Efate/Port Vila to detect rainfall intensity as part of low pressure systems impacting the country. Combined with the appropriate analytical tools, forecasting extreme weather and associated high impact events would be made possible with a high degree of accuracy and in a timely manner. Such data would then be incorporated into a range of ancillary CIS products by the VMGD including as part of relevant CLEWS e.g. warnings to local communities for flood prone catchments.

### ***Community needs***

While climate change is a global problem, its impact is felt most acutely by local people living in isolated rural communities. Local communities, especially the most poverty-stricken and vulnerable among them that depend on natural resources for their livelihoods, are particularly at risk. These communities and local/sub-national authorities need immediate assistance to strengthen resilience and increase their ability to manage climate change risks and linked opportunities as faced by their populations. While there are various community-based actions in response to climate variability and extremes, Vanuatu have fewer initiatives underway that address longer term climate change, especially in vulnerable communities. It is important that such support systematically integrates aspects of climate risk and resilience, and raises awareness amongst local communities on climate-induced changes which exacerbate existing environmental and socioeconomic problems.

Traditional knowledge is very much used by coastal communities in Vanuatu to prepare for extreme events and by farmers in deciding of which crops to plant. The integrity of these climate services play a significant role in the yield of the farmers' crop at harvest time. The integration of traditional knowledge with CIS is a challenge for communities in Vanuatu.

A number of assessments of community-based adaptation in the Pacific have found that to empower local communities, a participatory bottom-up and top-down approach is considered the best approach for the Pacific region. In addition, decision making for adaptation implementation needs to be systematic and transparent, and

grounded on robust socio-cultural, ecological and economic assessments of vulnerability and coping capacity. Furthermore, cost-effective and culturally appropriate technologies can enhance communities' resilience to climate related risks.

### **Baseline snapshots for the 5 target sectors and intended improvements against the baseline**

Summary baselines and intended improvements for each of the 5 key sectors are summarized below. Further detail and context is provided in the annexed Synthesis and Feasibility Report and annexed Consultation Report

#### **Water Sector:**

##### *Key Attributes:*

- Urban water supplies are provided by UNELCO (a private company) in Port Vila reaching over 90% of the population and Public Works in Luganville, Isangel and Lakatoro via a reticulation system servicing about 60% of the entire population with generally reliable and clean water, generally sourced from aquifers
- Other rural water supplies are operated and managed by the local community and is either sourced from groundwater via open wells and bores, from surface water sources, or rainwater collection with storage in ferro-cement or polyethylene tanks. Demand for irrigated water is extremely low and limited to a few small horticultural sites.
- In these rural areas there is a range of different problems with the delivery of safe drinking water including intermittent supply caused by drought or damaged infrastructure, contaminated water and competing uses for drinking water causing conflict in communities.
- Water in the context of catchment management and flooding is also an issue. Several catchments are prone to flooding (such as the Jordan River catchment in Santo and the La Cole River catchment on Efate) causing damage and disconnecting major populations to the main centres. This means that population are denied access to general services and local communities are not able to trade or sell their produce in the local markets. The damages to crops and infrastructures caused by flooding during tropical cyclone Pam contributed to the USD450K in loss and damages.

##### *Key CIS needs, uses and benefits*

- The Vanuatu Climate Update and Monthly Climate Summary, and the NIWA Water Watch, are circulated to Provincial Water Officers, and this information is passed on (when relevant) to community water committees
- Tailored information on rainfall forecasts on daily / seasonal / longer term basis linked with early warning systems for water management actions at household and community scales; and water infrastructure and management decisions at the national level.
- Still a need for more real-time access to climate data at the provincial level, in particular site-specific rainfall data.
- Early and real-time warning systems for vulnerable, flood prone catchments
- CIS based, land-use (and infrastructure) decision making support to reduce exposure of development to future flooding (and cyclone) scenarios.
- Over 150,000 population<sup>6</sup> will benefit indirectly based on population of all 5 main islands of Efate, Santo, Malekula, Tanna and Pentecost with major rivers that often get flooded. Over 70,000 of the

<sup>6</sup> This figure is based on the 2009 census of Vanuatu Population and Housing.

population is expected to benefit directly based enhanced EWS and information and support provided through the community climate centres.

### **Agriculture Sector:**

#### *Key Attributes:*

- 60% of the population rely on agricultural activities as the basis of household incomes and livelihoods, and it accounts for around 23% of GDP. Almost all agriculture activity is micro-scale subsistence based, for household consumption or sale at local markets.
- Almost all households maintain a household garden for household consumption 33 690 out of 33 879 households. Almost all household gardens in Vanuatu are less than a hectare in size. Women are particularly dependent on agriculture with 49% being involved (compared to 41% for men).
- Key crops include fruits and vegetables as well as coffee, vanilla, kava and pepper. Livestock is also kept and there are a few small hold farmers across livestock, coffee and coconut producers
- Agricultural production (and market activity) is high exposed and vulnerable to drought and cyclone impacts in particular.

#### *Key CIS needs, uses and benefits*

- Tailored information on rainfall and drought on daily / seasonal / longer term basis linked with early warning systems for management actions and decision making building on the Vanuatu Climate Update and the Monthly Climate Summary are sent to all Agriculture and Livestock staff by email, and representatives regularly attend the Climate Briefings. An Agriculture News Bulletin is produced quarterly, and often includes information on the seasonal climate outlook. Also, special leaflets are published (e.g. on mulching techniques, agroforestry, etc.) which are specifically designed to help farmers during times of climatic stress (e.g. drought)
- Comprehensive weather data collection climate information to support crop modelling and seasonal planning
- Downscaled modelling to support livestock (including bees for the production of honey) management and movements within and across islands as well as to inform agro-forestry animal husbandry priorities and planning
- Estimates of up to 60% of the entire population to benefit indirectly, based on general increase and uptake of CIS in decision making across the sector and 20,000 to benefit through direct and targeted and direct access to information and support provided through the climate change centers and associated activities.

### **Fisheries**

#### *Key Attributes:*

- Many ni- Vanuatu live close to the sea and 72% of the households possess fishing gear and engage in fishing activities. It is estimated that there are around 4000 fishing boats, of which 3500 are canoes taking on average 2.83 fishing trips per week, providing nutrition for around 60% of the population.

- The fisheries sector comprises the oceanic and coastal fisheries resources which are exploited at the subsistence, artisanal and industrial levels. Subsistence activities include coastal line and net fishing targeting demersal and small pelagic reef and lagoon fish, as well as reef gleaning and collection of shellfish and other invertebrates. Commercial harvest of oceanic (e.g tuna) fisheries resources are landed in overseas port though there is a small 'sea cucumber' export industry.
- Most of the catch is for home consumption or family distribution, but where markets or handling and distribution facilities exist some part may be sold.
- Vanuatu's Aquaculture sector is in its infancy with good potential to develop further in the future. The principle focus of aquaculture development in Vanuatu is to increase food security. Also important is the desire to reduce the pressure on wild stocks.
- Challenges relate to community management of fisheries in the context of vulnerable fishery ecosystems; sea temperature rise, and aquaculture sector planning, including land use.

#### *Key CIS needs, uses and benefits*

- More monitoring of climate-related impacts on fish (marine and lagoon) abundance and species mix, plus fish catch is required, and an impacts database needs to be established. There is a need for tailoring of climate information (such as long-term climate change maps and seasonal forecasts) for specific fisheries/aquaculture farmers. This should include threshold forecasts for specific indicators. Tailored information forecasting species distribution and stock, particularly for the sea cucumber as it is effected by El Nino warming events.
- Site specific forecasts would also be very useful. Improved access and ability to apply climate data and information is required, and improved technology is needed to support a marine climate early warning system for Vanuatu. Work needs to be done to identify actions that can be taken to lessen climatic impacts to marine resources. An update to the ENSO Handbook for marine resource management is required, and the development of a climate-marine bulletin in partnership with the Department of Fisheries has been suggested
- Enhanced early warning systems to mitigate damage to fishing equipment.
- Strengthened coastal ecosystem resource mapping including location and status of seagrass beds, and coral bleaching forecasts
- Specialized and tailored CIS to support development of the fledgling aquaculture industry, including information on climate sensitivity of species used in aquaculture
- Up to 60% of the population is expected to indirectly benefit through increased use of CIS in decision making for enhanced fisheries outcomes and 20,000 of the population to benefit directly based on direct application of CIS in coastal resource and hazard mapping associated with the 'hot spots'.

#### **Tourism**

##### Key Attributes

- Tourism and tourism-related services sectors (wholesale and retail trade, hotels and restaurants, and transport and communication) account for approximately 40 per cent of GDP and one third of people

in formal employment. It is largely based on providing enjoyment of natural attractions, unique cultural experiences, shopping and hospitality. The sector provides for around 4,000 direct jobs.

- Climate impacts on the tourism industry are predominately from cyclone activity which can have sudden and devastating impacts. Cyclone Pan was estimate to have had a 5.9 billion vatu impact on the sector
- Climate change is expected to impact environmental resources that are critical attractions for tourism, such as coastlines (e.g. beaches and mangroves), wildlife (e.g. bird watching, whale watching) and biodiversity

#### *Key CIS needs, uses and benefits*

- The top priority for the Department of Tourism is to work with VMGD to develop Traditional Calendars for each of the provinces which would enable tourism operators to really utilise attractions. Cultural events occur in conjunction with specific weather/climate events, so Traditional Calendars could be used to identify when and where these cultural events typically occur. VMGD climate information could be used to inform potential shifts in the timing of these events.
- Capacity and knowledge on the environmental impacts of tourism operations is needed, leading to improved standards for environmentally sensitive operations.
- There is also an interest in receiving tailored climate bulletins. These could be linked to a web-based 'Climate and Tourism Dashboard' – showing the status and forecasts of temperature, rainfall, coral bleaching and SST indicators that could be printed and posted on noticeboards at hotels etc.
- There is a key need to mainstream climate change into tourism related policy instruments
- Priorities included medium term/seasonal forecasting to help inform tour planning (operating on 6-12 month time scales); information to assist in the design of weather proof (cyclone proof) accommodation; information to assist with planning of water resources associated with tourism sites and operators;
- The use of CIS to help in the planning and development of agri/agro/eco-tourism sector, including hazard mapping; resources to support and facilitate dissemination of CIS and weather information from VMG to the sector.
- Early Warning systems to inform boat travel between islands was also identified as priority
- Indirect beneficiaries of 5000 based on those directly employed in the sector
- Direct beneficiaries to be a proportion of the entire sector to be determined based on case study application (estimated to reach up to 25% of the industry with direct deliverables).

#### **Infrastructure**

##### Key attributes:

- More than 90% (of the economic value) of Vanuatu's infrastructure is located 500m from the coastline
- The main climatic impact affecting infrastructure and public utilities work is higher-than-normal rainfall and flooding.
- Key infrastructure assets include roads, bridges and public and private buildings, including a domestic housing stock, which outside of major urban areas is 'traditional housing' made from constructed from local materials such as thatch, natangura (woven palm fronds), woven cane, or other naturally available materials

- Consideration of climate change impacts for the ongoing planning and design (including location and construction standards) of infrastructure is critical and currently there is no formalized mechanism to ensure impacts are taken into account.
- The Ministry of Infrastructure and Public Utilities currently uses weather forecasts and tide information for aviation and ports/marine operations. All Ministry staff receive the Vanuatu Climate Update and Monthly Climate Summary, but these products are currently not used operationally.

*Key CIS needs, uses and benefits*

- The highest priority for the Ministry is access to sub-hourly (e.g. 10 minute) rainfall intensity data (including return period analyses) for the catchments they are designing bridges/roads for. Accurate weather forecasts are needed for day-to-day management of infrastructure projects, such as road upgrades and maintenance.
- Seasonal forecasting would be useful to inform project planning and resource mobilisation, while climate change assessments are needed for future infrastructure investment planning. Climate services could include notifications/bulletins with simple messaging such as ‘rainy season approaching; more rain than normal expected; so check and clear debris from drainage channels, bridges and culverts.’
- Regular posting on the VMGD website of up-to-date location-specific climate information would be useful and there is a pressing need for automatic climate stations to be installed at all provincial airports
- The Ministry of Infrastructure and Public Utilities currently uses weather forecasts and tide information for aviation and ports/marine operations. All Ministry staff receive the Vanuatu Climate Update and Monthly Climate Summary, but these products are currently not used operationally.
- Update Vanuatu Climate Resilience Roads Manual and Building Codes and across its linkages to EIA regulations.
- Indirect beneficiaries are estimated to be close to 100% of Vanuatu, in the long term through integration of CIS in to infrastructure planning at national, provincial and community levels.
- Direct beneficiaries based on the provision of information and through the 10 community climate change centers plus to be determined based on case study application.

### C.3. Project / Programme Description

The proposed four year national project in Vanuatu (2017-2021) will feature the development and use of best-available CIS designed to facilitate enhanced adaptation pathways, with emphasis on creation of “actionable” knowledge within a strategic, logic-based (theory-of-action) framework (i.e. data-information-knowledge-action-outcome-impact value chain, as per **Figure 8** below, and Attachment 2) customized to needs of target sectoral and community end-users in Vanuatu.

The project will focus on delivery of a set of highly interlinked activities, to achieve the project outcomes, including training and capacity development; development of practical CIS tools and resources, supporting coordination and dissemination of tailored information; and building the requisite information and technology infrastructure. Further, a key feature of the project is in the support it will provide for the application of CIS to real-time existing and / or emerging sector specific development policy, planning and project processes



(particularly climate adaptation and disaster risk management initiatives), or 'case studies'. . The sectoral case studies will also serve as a focal point for much of the (sector specific) training, resource development, capacity support etc, to be delivered as per the project components described below. The case studies will be aligned with relevant adaptation and associated disaster risk reduction strategies and sectoral priorities in Vanuatu.

Through broad stakeholder engagement and delivery of communication products, it is expected that the utility of the project CIS will have broad application across multiple sectors beyond just the immediate case study focus.

### **Summary of Project Outputs and Outcomes**

The key Outputs are:

- **Key Output 1:** Multiple Next/End-user engagement and capacity development activities including new sector specific CIS action plans, guidance materials and databases, technical training, advisory and assessment workshops, mentoring and attachments and other miscellaneous in-country exchanges
- **Key Output 2:** Suite of sector specific CIS development case studies (at least one per sector for term of project) which provide the platform for development, delivery, application and demonstration of CIS tailored to the adaptation needs and resilient planning and development roles of target Next/End-Users including based on tailored H/R/V assessment and associated climate and weather data.
- **Key Output 3:** Suite of customized communication, capacity development and outreach resource materials including communication and media products, training materials, climate management tools, portals and Decision Support Systems, hands-on expert technical support, and full suite of documentation and web-based capability and content for building capacity, for raising awareness and visibility and for improved adaptation and resilience planning and development
- **Key Output 4:** New weather and climate infrastructure for enhancing development and delivery of CIS in Vanuatu, including new IT and observational infrastructure for VMGD (including Doppler radar installation), new sensors and associated measuring instruments for fine spatial scale data collection in and around designated climate (vulnerability) hot spots, and new communications infrastructure for real-time delivery and outreach of CIS to local communities (including Community Climate Change Centers).
- **Key Output 5:** Digitised and quality controlled observational and related/ancillary socio-economic data secured and accessible within functional CDMS (including appropriate analysis/report applications) and/or other relevant databases ready for uptake and application by climate adaptation and disaster risk management planners and policy makers.
- **Key Output 6:** Down-scaled and/or regionally specific CLEWS, sub-seasonal/seasonal forecast and long-term projections data and information tailored to sectoral Next/End-user adaptation and disaster risk management policy development and planning needs and roles.

Activity Areas under each Component Activity describe the specific Deliverables that fall within one or more of these six Outputs, and have been aligned with target Next/End User groups (see Attachment 5a-e for). The

expected (GCF) Project Level Outcomes to be achieved by the delivery of the integrated set of Deliverables (within the Output Categories) , and as reflected in the GCF PMF/RMF include:

- **Strengthened institutional and regulatory systems for climate responsive planning and development (A5.0)**
- **Increased generation and use of climate information in decision making (A6.0)**
- **Strengthened adaptive capacity and reduced exposure to climate risks (A7.0)**
- **Strengthened awareness of climate threats and risk-reduction processes (A8.0)**

### **Scope of proposed activities**

The scope of proposed activities addresses the baseline condition in Vanuatu (Section C.2) and priority CIS gaps and needs, identified including through recent stakeholder consultations in Vanuatu, including as part of the related GCF Readiness Project activities (see also Section C.2).

They specifically build on the priorities and associated aspirations of the Vanuatu Meteorology and Geo-Hazards Department (VMGD) Strategic Plan (2014-23) and key recommendations of the *Vanuatu Framework for Climate Services* (VFCS: 2016). Accordingly, the activities are structured (and presented below) in a complementary manner aligned with the five pillars of the *WMO Global Framework for Climate Services Implementation Plan* (2014) (which also mirrors the VFCS) and the associated Pacific Climate Services Roadmap (2015). In addition to the WMO GFCS pillars, an additional Component (#6) entitled ‘Project Management and Development’ describes the Project Management arrangements for the project

The proposed set of activities will be managed by the two Executing Entities (SPREP and VMGD) according to a detailed Work Plan to be developed during the formal Inception Phase (first 3 months) of the Project.

### **Component 1.0: Capacity Development**

Project Activities within this Component are designed to address identified capacity gaps and priority training needs of target Next/End-Users. This will include through delivery and support for skills-based training; mentoring and attachments; ‘community of practice’ networking; and expert ‘help-desk’ advice.

The proposed sub-component activities under Component 1.0 address gaps and needs identified for baseline conditions under Section C.2 and build on VFCS priorities including Section 6.0 (*Climate Service Users*)/Recommendations #1-3; Section 11.0 (*Capacity Development for VMGD and Stakeholders*)/Recommendations #15-16; and Section 12.0 (*Procedures and Governance*)/Recommendations #17-18:

- **Activity 1.1 (Lead Execution Entity – VMGD): Review existing Vanuatu Government policy, planning and associated institutional/governance arrangements** as related to climate adaptation and disaster risk management, and use of CIS. This will involve an environmental scan and systems analysis of existing institutional arrangements, consultation, and other investigative and analytical approaches designed to identify options through which CIS could be better incorporated into decision-making, with a focus on the 5 target sectors.

These options will include planning processes, policy, institutional arrangements, and, potentially, legislative reform. Where appropriate, preferred options will be progressed through existing 'machinery of government' processes to facilitate enhanced adoption of CIS to inform and mainstream 'climate smart' decision-making at national/sub-national level for priority sectors.

Deliverable 1.1 (Output #1):

- Documented review (Review Report) of sectoral institutional arrangements and capacity (to inform) the design and implementation of subsequent sector integrated action strategies, Decision Support Systems, monitoring and evaluation, training requirements and knowledge sharing and communications
  - Ongoing stakeholder engagement and workshops across 5 sectors, including support for policy and institutional reform processes to facilitate enabling of CIS.
  - National and provincial Tourism/Agriculture/Fisheries/Water/Infrastructure integrated CIS Action and Communications Plan for Climate Change and Disaster Risk Management where the application of CIS is the key driver
  - Delivery of the activity will be supported by each of the 5 (Project) Sector Coordinators
- **Activity 1.2 (Lead Execution Entity – SPREP): Delivery of targeted training and on-the-job support for application of CIS** within the selected target sectors for Next/End Users needs and roles. The training will be framed by the case studies (see also 1.3) and based on findings of Activity 1.1 and focus on building capacity within each of the target sectors, and for each of the target stakeholder next/end users to enhance understanding and application of CIS. Delivery of the activity will be supported by each of the 5 (Project) Sector Coordinators.

Deliverable 1.2 (Output#2 & 3):

- Technical (science/adaptation) outreach resources (prepared and disseminated) including training workshop handbooks and guidance materials and complementary on-line resources (such as via Vanuatu NAB Portal, VMGD website and Vanuatu Climate Futures and Pacific Climate Change Portal)
  - Technical CIS skills-based training/workshops, including organisation, delivery, facilitation and reporting of Next/End-user CIS outreach (each for up to 30-40 people): 1 x 5 day national/sectoral workshop/yr 5 x 2 day provincial workshops/yr 10 x 1 day community workshops/yr); and
  - Technical mentoring & attachments customized for target Next/End-Users needs and roles; latter to be based on short-medium term (3 month- 3 year) collaboration deployments of key Next-End Users in Vanuatu and technical experts within Delivery Partners as part of sectoral pilot-projects/case studies.
- **Activity 1.3 (Lead Execution Entity – VMGD): Apply CIS through selected case studies within the priority sectors.** This will involve VMDG (with support from project committees and regional partner) working with the sector coordinators to design and oversee implementation of the case studies and identify the processes/methodology to demonstrate CIS applications in real-time decision-making while building the capacity for Next-End-Users at relevant national, sub-national/local community levels in Vanuatu.

The case studies will integrate a number of the activities within each of Components 1-5 and in addition involve the packaging together and presentation of key information to describe and demonstrate how CIS has contributed to climate resilient development. The design of this Sub-Component is based on direct experience of SPREP and partners in undertaking such CIS-based case studies previously in the Asia-Pacific region. Individual case studies are to be led/coordinated by sectoral coordinators and will implement, evaluate and enhance best practice approaches to on-ground real-time application of CIS across multiple climate hazards and Next/End-Users and over multiple time-frames (sub-seasonal/seasonal/multi-decadal). The demonstration of real-time case studies in the sectors where CIS was mainstreamed in decision making contribute positively to resilience development will support understanding of CBA and investments in CIS and early warning systems and build the confidence and buy in of the Next/End - Users.

Deliverable 1.3 (Output#2):

- Documented design, development, implementation, coordination, reporting and communication of results/learnings for at least one case study for each priority sector over the term of the project based on relevant, actual/real-time climate policy development, planning and associated decision-making processes for example the integration of the CIS into the “Climate Resilience Road Manual” developed by the Ministry of Infrastructure.

- **Activity 1.4 (Lead Execution Entity – VMGD): Establishment of and support for a Vanuatu network of community-based CIS ‘champions’** to facilitate access and use of CIS by local communities impacted by climate ‘hot spots’ (e.g. communities that are subject to known climate hazards such as extreme sea level events/storm surge and coastal inundation and erosion, extreme rainfall, etc.). This activity will enhance citizen capacity at community levels for the use of CIS and integration with Traditional Knowledge to support resiliency. This will be delivered in the context of support for building capacity at the Provincial level through the Provincial ‘Climate Change Community Centres’, that were piloted successfully by the Finland-Pacific (FINPAC) project in the Epau community, on Efate Island. The activity will support on-going training and support, communications with the VMGD and sector coordinators and overall coordination of local stakeholders and dissemination of information. The activity will have a focus on the 5 sectors, and linking with the 5 case studies where appropriate. The focus will be on ensuring community based development incorporate and applies CIS in appropriate ways, and will support and employ existing government communications channels for the receiving and re-distribution of CIS to sectors and community uses at provincial level. The activity will be strengthened by establishing new and/or enhancing existing community centres as a hub for climate information and knowledge sharing. Where prioritized/ appropriate, the centres may also function as evacuation/emergency shelter centers. Centers will be located in designated climate ‘hot spots’.

Deliverable 1.4 (Output#3 & 4):

- ‘Citizen science’ capacity at local community level (e.g. school and church groups etc), including data collection, communications and awareness raising aligned with sector specific case studies; to be linked to development and application of Vanuatu Traditional Knowledge (TK) climate database at VMGD.
- Provincial ‘Climate Change Community Centres’ housed within the existing 8 Provincial Government Centers, including at least 2 x Community Climate Change Centres in each of 5 x provinces, new

and/or upgraded infrastructure, IT & comm's support, and established community-based 'citizen science' networks for each Centre.

- **Activity 1.5 (Lead Execution Entity – SPREP): Establishment and delivery of accredited graduate/post-graduate level mentoring and training research attachments**, designed to facilitate long-term sustainable climate science capacity in VMGD. This activity will provide support to VMGD, selected sectors and provincial representatives to retain and sustain long-term sustainable capacity in-house to support the generation, communications and uptake of high quality CIS information for resilient development.

Deliverable 1.5 (Output#1):

- Up to 3 scholarships and/or formal traineeships for periodic post-grad/grad-diploma level in-country (Vanuatu) as identified by VMGD.
- Mentoring Attachments involving relevant VMGD technical personnel and science experts and linked to case studies, modelled where appropriate on previous USP-PACE SD Pacific Climate Leaders Program and PACCSAP Mentoring and Attachments.

- **Activity 1.6 (Lead Execution Entity – SPREP): Provision of enhanced, expert CIS remote 'Help-Desk' support to Vanuatu Government/VMGD** and where appropriate sectoral coordinators, through existing Pacific Met Desk partnership. An enhanced PMDP Help desk capacity will quickly furnish response and technical support to the VMGD and support to sectors (through Sector Coordinator positions) with access to expertise in near real time. In addition to providing real-time technical support for in-country sectoral stakeholders as part of the delivery of the CIS case studies, this activity will assist the Vanuatu Government in translating the relevant details in the Paris Agreement pertaining to the role of CIS into actionable activities that the Vanuatu Government can implement as part of its obligations to the UNFCCC and people of Vanuatu. This Help-Desk function will be specific for Vanuatu, however over time (and by project completion) will be progressively transitioned to new regional Pacific Climate Change Centre based at SPREP on a staged basis once commissioned to facilitate long-term sustainability of relevant outcomes, including for other PICs.

Deliverables (Output#1&3):

- On-call back-office Pac Met Desk Partner (human resources) expert support for undertaking sectoral CIS case studies as part of this project and support for the regional CIS Community of Practice, including real-time guidance, analysis and review function, problem resolution and CIS networking and representation for relevant national/international CIS forums,
- Support for Government of Vanuatu international negotiations as part of post-Paris (COP21) UNFCCC Council of Parties process; to include interpretation and use of latest global/national climate projections as part of pending engagement through the IPCC 6Th Assessment Report (Working Group 1, 2 & 3), and alignment with existing SPREP (UNFCCC related) training and support for partner PICs.

- **Activity 1.7 (Lead Execution Entity – VMGD): Skills-based training of Doppler radar operator and maintenance technicians in VMGD.** This activity will provide the necessary training and technical support

for VMGD personnel to ensure the effective and efficient operation, use and maintenance of the Vanuatu radar installation, and the incorporation of radar data into CIS products, systems and procedures, consistent with other elements of the project. Risks and associated mitigation mechanisms relating to security of the installations, such as from severe weather, theft and vandalism, fire and geo-hazards etc will be addressed as part of standard operating procedures developed as part of new Standard Operating Procedure (SOP)-based protocols for the VMGD.

Deliverables:

- Upskilled training of existing VMGD observational system operators and technicians
- New SOP-based protocols for initial commissioning of the system and ongoing operations and maintenance,

## Component 2.0 – User Interface Platform

This component is about developing and delivering customized CIS communications, knowledge products and knowledge brokering support across the target Next/End-User network in Vanuatu. Activities within the component will support delivery of the case studies and result in broad coverage, sector specific awareness and capacity for CIS delivery and uptake in Vanuatu. Specifically, the proposed sub-component activities under Component 2.0 address and build on Section 9.0 (*User Interface Platforms, Partnerships, Networks and Communication Mechanisms*)/Recommendations #10-14 of the VFCS.

- **Activity 2.1 (Lead Execution Entity – VMGD): Development and delivery of new and innovative CIS communication products** that are sector/impact specific designed to raise awareness across Next/End-Users of key climate risks related to priority sectors. Activities within the component will support delivery of the case studies and result in broad coverage, sector specific awareness and capacity for CIS delivery and uptake in Vanuatu. All products, while fit for purpose, will also be designed to be long-lasting resources used to facilitate long-term and sustained awareness of CIS in Vanuatu. The target audience of Next/End-Users for the CIS is as described in Attachment 1 and all such CIS will be tailored to these specific needs as outlined in Section C.2.

Deliverables (Output#1, 2 &3):

- Enhanced CIS content for Vanuatu Climate Watch, Vanuatu Climate Updates (VCUs) and Vanuatu Climate Summaries (VCS) with reference to historical climate data where appropriate, communicated routinely to national, provincial and community users.
- Short (5) sector specific videos based around sectoral case studies (Sub-Component 1.3), designed to increase the understanding and application of CIS in Vanuatu and to complement existing Klaod Nasara and Climate Crab climate animations and associated facilitator (training and educational) resource materials where appropriate.
- Other customized resource materials including educational climate games, posters, fact sheets, case study brochures and other static materials, media engagement to support community level awareness and education via proposed Provincial Climate Change Community Centres in high risk locations (actual number TBC; subject to existing Vanuatu Government/World Bank climate ‘hot spot’ vulnerability assessments)

- Community-based Traditional Knowledge and local language (Bislama) resources designed to complement technical CIS Deliverables and to facilitate community level capacity development for relevant community resilient development planning and implementation
- All community-based communication products to include English, French and Bislama translations and formatted for multiple delivery formats including static display, DVD, TV and web-based download where appropriate.
- **Activity 2.2 (Lead Execution Entity - SPREP): Adapt (from existing) and deliver new customized CIS Decision-Support System (DSS) processes and tools**, based on relevant hazard/vulnerability/ exposure /adaptive capacity risk assessment and associated mainstreaming methodology, and lessons learned from around the region (e.g. Australia's Climate Ready and Coast Adapt web-tools) and specific to Vanuatu. The new customized CIS DSS tools developed will provide communities access to and support the application of science-based CIS into climate change adaptation and disaster risk reduction. The DSSs and tools will be demonstrated and evaluated in selected case studies in relevant sectors across all designated Next/End-Users.

Deliverables (Output#3):

- Documented report and database of existing and/or new 'rapid' climate vulnerability assessments for Vanuatu where appropriate, with updated climate hazard hotspot risk assessments for priority sectors
- Customised and operational CIS-based DSS for sectors (informed by outcomes of Activity 1.1 (CIS institutional analysis) as well by outcomes of Activity 1.2 (sector specific CIS case studies)
- Sectoral DSS to include standardized risk assessment methodologies, guidance materials and visualized databases in hard/soft copy and/or on-line format where appropriate.

### Component 3.0: Climate Information Services System

Component 3.0 activities will focus on development of and support for CIS desktop, on-line and associated operational IT *delivery* systems. It is distinct from Component 2.0 in that it focuses on the communication platforms (particularly IT) for the delivery of, rather than the development of, CIS support resources (which is the focus of Component 2.0). Specifically, the proposed sub-component activities under Component 3.0 address and build on Section 6.0 (*Climate Service Users*)/Recommendations #4-5 and Section 8.0 (*Climate Information*)/Recommendations #6-9 of the VFCS.

- **Activity 3.1 (Lead Execution Entity – VMGD): Delivery of all on-line CIS outputs including more customized access for Decision Support System tools and processes** (Component 2). This will be focused on / include delivery and access, via the VMGD Warning Information Dissemination Platform, and complimentary sector specific 'Climate Watches' (as referred by the VFCS). These resources will be appropriately interfaced with the Vanuatu National Advisory Board (NAB) Portal and Vanuatu content of Pacific Climate Change Portal. This activity will support enhanced access to key project (and other) CIS products and support tools for use (in particular) by government agencies, the private sector and other development sectors. It will include:

Deliverables (Output#4):

- Upgraded IT platform including computing hardware and software to support all relevant CIS data, information, DSS tools, knowledge products etc interfaced with existing NAB/VMGD, CliDE data management system and other Pacific IT climate platforms/portals and communications infrastructure

- **Activity 3.2 (Lead Execution Entity – SPREP): Development of a *Vanuatu Climate Futures* portal**, based on a customized version of the existing (PACCSAP) Pacific Climate Futures web portal. This will include enhanced functionality for accessing, analyzing and visualizing multi-decadal GCM and down-scaled projections and sector specific application-ready datasets for key climate variables; and assimilation of on-line training materials and guidance materials for accessing and applying projections for risk assessments across five sectors.

Deliverables(Output#3, 4 &5):

- Operational Vanuatu Climate Futures portal interfaced with the VMGD Warning Information Dissemination Platform (3.1), and (support for VMGD to produce) tailored CIS products for sector specific needs

- **Activity 3.3 (Lead Execution Entity – VMGD): Update currency, functionality and visualization** (including photos, videos and spatial mapping) **of Vanuatu climate data records** for Pacific Climate Change Data Portal, Pacific Tropical Cyclone Data Portal and other relevant climate data portals; where appropriate harmonise IT interface with desktop CliDE/CliDEsc data management system and associated Climate Early Warning Systems (CLEWS) in VMGD. This will support CIS Users to be able to view data and generate standard time series trends in historical climate data on an annual and seasonal time scales over any period of interest (where data is available from VMGD).

Deliverable 3.3 (Output#5):

- Updated Vanuatu rainfall, temperature and tropical cyclone data on the Pacific Climate Change Portals with recent observations
- Update updated and homogenized datasets on the Pacific Climate Change Portals linked to the CliDE/CliDEsc platforms

- **Activity 3.4 (Lead Execution Entity - VMGD):Development and implementation of IT and associated communication platforms for sector-based multi-hazard ‘impact’ CLEWS** (where appropriate for flooding, storm surge, storm/tropical cyclone hazards; subject to availability of requisite hydrology, bathymetry, topography data and associated models incorporating key meteorological data) over hourly-multi day/week time periods (actual time periods subject to most technically feasible and cost-effective option). The focus of EWS will be on high risk climate hotspots (vulnerable and exposed catchments and coasts - urban and rural, and communities and infrastructure) determined from analysis of existing, spatially explicit VMGD data for purpose of developing, implementing and demonstrating CLEWS (n.b. the methodological approach to CLEWS development will vary depending on the site specific details for the hotspot locations which in turn will be finalized during the project inception phase. The CLEWS developed by this project will be a combination of both technology/modelling-based CLEWS and low-tech community-based CLEWS for specific hazards dependent on data availability and relevant community resources

Deliverables (Output#3, 4 &5):



- Developed and deployed/operational coastal CLEWS featuring real-time wave buoy data (one-off), sea level pressure sensors (10 off; 2 in each of five provinces), and upgraded stream and rainfall gauges for existing high risk ('hotspot') communities, catchments, coastlines and infrastructure (number and location to be confirmed during project Inception Phase)
- Operational CLEWS-based web, mobile phone App, electronic/social media and other cost-effective and efficient communication modalities including Customised phone app(s) developed and commissioned for real-time uploading of EWS data and rainfall data from existing observer network
- Integrated on-line, mobile phone, media (radio/TV) and social media platform (software and hardware) for communications of EWS notifications to all Next/End-users for operationalizing such CLEWS interfaced with existing/proposed sector and community response mechanisms, including provisions for communities with limited resources.
- CLEWS-based CliDEsc (suite of 'bolt-on' software applications for accessing and reporting data from CliDE and related existing (PACCSAP/COSPPac) climate data portals), including enhanced data analysis, visualization and reporting,
- Backup systems for CLEWS including data storage, power supplies and communication systems across Next/End-user network as well as Infrastructure (hard and soft) maintenance support
- **Activity 3.5 (Lead Execution Entity – SPREP): Development and delivery of web-based, mobile device-compatible DSS to inform the agricultural sector**, where feasible using remote recorded agro-meteorological data and near real-time weather and climate data from VMGD weather stations (see also Sub-Component 4.4 and 5.8):  
Deliverables (Output#2 & 3):
  - Agro-met services including historical/present/forecasted climate information, observation/forecast-based agricultural information such as agro-met indices with relevant crop phenology and yield information and optimal farm management, and agro-data collection and smart update of system parameters using a crop-climate diary platform
  - Crop-climate diary: a mobile phone App for agro-data collection as one of the DSS functions, to record essential crop data for diverse cropping systems and corresponding climate data out in the field (works offline but synchronizes data with DSS database once becoming online) and to support crop compliance documentation for market and export
  - Agro-met information portal where general or country-specific climate smart practices and adaptation strategies to climate variability are archived
  - Agricultural sector-specific climate information connected and utilized by CLEWS(CliDEsc) to translate into agriculturally-relevant information like warnings on abnormal changes in crop phenology or crop failure where appropriate
- **Activity 3.6 (Lead Execution Entity - SPREP): Undertake Socio-Economic Benefit (SEB) analysis for Vanuatu using customized Pacific CIS Cost-Benefit Framework (CBF)** to provide preliminary Triple Bottom Line (economic, environmental & social) benefit-cost ratios for delivery of the project activities (i.e. enhanced, science-based climate information, products, services and associated knowledge and capacity), consistent with recommended methodology of WMO (2015). Based on the SEB analysis results in Vanuatu, the CBF will be further developed for application in other (GCF funded) CIS projects as part of

implementation of regional work program in other partner countries in western tropical Pacific. This activity will validate ongoing GCF investments in Pacific CIS as part of the Pac-CIS-RDP regional programme through provision of critical quantitative economic metrics as part of the Monitoring and Evaluation of CIS in Vanuatu

Deliverables (Output#5):

- Annual/Final assessment of CIS socio-economic cost-benefit quantified and reported
- Enhanced socio-economic (triple bottom-line/social, economic and environmental) data base from Vanuatu Chamber of Commerce (additional in-country support provided to collect and collate) raw data customized for five priority sectors with back-office analysis, synthesis and visualization for quantifying and reporting relevant metrics against performance criteria
- Value-added data inputs to facilitate implementation of (mid and final term) project M&E including to inform GCF Performance reporting criteria

#### Component 4.0 – Observations & Monitoring

Component 4.0 activities will focus on supporting climate observations/data collection, data management, infrastructure & maintenance. Specifically, the proposed sub-component activities under Component 4.0 address and build on directions and priorities of Section 7.0 (*Climate and Impact Data Observations and Monitoring*) of the VFCS.

- **Activity 4.1 (Lead Execution Entity - VMGD): Rescue and digitise high quality daily/sub-daily data from archived paper records for key climate parameters** (including temperature and rainfall) from relevant observations stations for purposes of uploading to CliDE and associated VMGD data portals (noting that a complete and accurate digitized record of national climatology is a fundamental resource that every partner country needs to be able to develop and implement scientifically robust, data-based CIS), including:

Deliverable 4.1 (Output#3 & 5):

- Digitised daily/sub-daily climate records for key parameters (including temperature and rainfall) quality controlled and entered into CliDE
- Updated standardized WMO Climate Extreme Indices for incorporation into CIS knowledge products and relevant portals

- **Activity 4.2 (Lead Execution Entity - SPREP): Collect new coastal (inshore) bathymetric and topographic data for high risk (hazard/vulnerability) climate 'hot spots'** using most cost-effective means via some combination of LIDAR, high resolution satellite imagery and/or on-ground assessments; data to be Validated, uploaded, visualised and inter-faced with customized applications such as user-based Decision-Support Systems (see also Component 2) and where appropriate GIS-based 3D mapping (see also Component 3.0), including for access via relevant portals (both national and regional: Vanuatu NAB portal, Vanuatu Globe etc). Where appropriate data will also be integrated and validated with support of citizen science activities undertaken through Provincial Climate Change Community Centre activities and associated development of 'citizen science' databases.

Deliverable 4.2 (Output#3 & 5):

- Compatible LIDAR sensor (one off) commissioned for existing drone mapping system and collection of new LIDAR and associated satellite imagery, coastal bathymetry and catchment topography and associated GIS data sets for vulnerable coastal and catchment 'hot spots'
- Analysed, synthesized data sets assimilated into/real-time interfaced with CIS products and services (Component 2), EWS and DSS systems (Component 3) and model-based forecasts and projections Deliverables (Component 5) where appropriate
- `Backpack-based GPS coastline mapping units (two off) for deployment in association with citizen science 'shoreline' and coastal resource data mapping, and new 'citizen-science' database interfaced with coastal and catchment mapping databases

- **Activity 4.3 (Lead Execution Entity - VMGD): Undertake development (incl. back-up systems) and maintenance (incl. servicing and spare parts) of existing VMGD weather and climate infrastructure** where required to ensure security of critical CIS-related data and information collection.

Deliverables (Output#4):

- Upgraded security, reliability and annual maintenance of existing manual observational stations, Automatic Weather Stations (AWS) and new AWS as appropriate to ensure adequate CIS coverage for designated 'hotspots' relevant to sectoral case studies
- Associated IT systems/servers, communications infrastructure and associated web platforms and mobile phone apps (for both advisory and data upload purposes as appropriate), and
- Automated data uploading to CliDE/VMGD from existing rainfall observer network and Sarakata Reservoir level monitoring gauge as part of newly deployed flood-based CLEWS
- Operational CliDE data management system linked to AWS data via new interface and rainfall data from new phone app customized for existing rainfall observer network

- **Activity 4.4 (Lead Execution Entity - VMGD): Installation of new automated weather stations where required for collecting core agro-meteorological data** in selected (3-5) provinces/islands (subject to priority/agreed crop types/systems) for tailored crop forecasts, including sensors for solar radiation with sunshine, air temperature, soil moisture, precipitation, relative humidity, wind speed and direction, and a data logger and GSM antenna for automatic data transmission to a server (see also Sub-Component 3.5 and 5.8). The activity will also include:

Deliverables (Output#4 & 5):

- New automated rain gauges linked to agro-met station telemetry network for real-time collection and reporting of data will also be installed and there will be intensive trainings to VMGD staff for sustainable operation and maintenance (to include 10-year sensor replacement and maintenance warranty for the agro-met equipment)
- Where required, at least four automatic rain gauges with the data logger and antenna installed for case studies for climate smart irrigation
- Data interface to CliDe and VMGD portals where appropriate

- **Sub-Component 4.5 (Lead Execution Entity - VMGD): Installation and commissioning of new Doppler radar system.** VMGD has been relying on global scale numerical weather prediction models for extreme weather events including prevailing wind and rain related to storms and tropical cyclones, but lacks real-

time precise observational data in large areas of the country not otherwise covered by existing stations. Existing radar coverage in the north of the country is limited by the location of the relevant installation in neighboring New Caledonia. The installation and operation of a Doppler radar located in proximity to vulnerable communities in the south of the country is deemed a critical need to complement CIS-based CLEWS to be developed as part of this project (see also Section C.2). Based on Australian (Bureau of Meteorology) experience capex budget for a single radar installation has been established of US\$5-6m, with an additional opex budget requirement of US\$3.75-4m over the period of a 15 yr operational life<sup>7</sup>. This activity will be further developed with additional details relating to the scope of the proposed installation and operation of the radar in Vanuatu to be undertaken as part of the proposed Inception Phase, including a technical feasibility study and business case to address initial design, construction and ongoing operation, maintenance and security; thereby to ensure the infrastructure is in place and operational, with trained technicians, by end of Yr 1 of the project.

Deliverable 4.5 (Output#1 & 5):

- Technical design study and business case for new radar installation to be located near Port Vila to service southern Vanuatu
- Installation, operation and maintenance of radar including security and emergency power supplies, and development of new standard operating protocols for incorporating radar data and information into relevant CLEWS within VMGD and sectoral CIS action plans

### Component 5.0: Research, Modelling & Prediction

Component 5.0 activities will focus on further development of multi-disciplinary (including climatology, oceanography and meteorology), multi-sectoral (five priority sectors in Vanuatu), multi-time scale (sub-seasonal/multi-day, seasonal, multi-decadal) CIS. Specifically, the proposed sub-component activities under Component 5.0 address and build on directions and priorities of Section 10 (*Research, Modelling and Prediction*) of the VFCS.

These activities will collectively involve review, analysis, documentation and incorporation of the latest climate and associated environmental data and research findings for the Pacific in relevant CIS outputs to ensure that all such CIS are scientifically robust, continuously technically improved/updated, and thereby informed by the latest and most innovative scientific understanding and applied knowledge across multiple (climatological, meteorological and oceanographic) disciplines (n.b. as per the proposed 'science informing services' knowledge value chain and associated CIS Science Technology and Innovation (STI) pathway designed to facilitate transformational change through mainstream application of CIS and associated science-based evidence for decision-making - see section E.2 Paradigm Shift) . These activities primarily involve the core of the scientific and technical expertise (personnel and IP) of the Delivery Partner consortium and consistent with the GFCS guidelines are thereby the source of new and/or customized CIS knowledge.

This knowledge is typically generated by analysis of new and existing data, development of new and/or improved models, tools, communication/knowledge products and training materials for capacity development. The various outputs from this Component are typically cross-cutting and inform or otherwise support the

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<sup>7</sup> As per the letter of commitment VMGD intends to absorb the maintenance costs into its annual operating budget

outputs generated through other Components/Sub-Components of the proposed activities for the project. These Sub-Components are therefore deliberately designed to be complementary across multiple scientific disciplines (including key aspects of climatology, meteorology and oceanography) and thereby facilitate operational synergies across the scope of work, including to meet the needs of multiple target Next/End-Users (see Attachment 1) and over multiple time frames (weather through to climate).

These Sub-Components will be delivered both in-country and back-office at various times subject to the specific methodologies being employed (noting that some high powered computing infrastructure is required for analyses of larger scale observational and model output datasets). At all times however, each Sub-Component is designed to generate outputs of direct relevance to CIS needs of Next-Users and subsequent End-Users in Vanuatu, typically via the project support personnel and/or IT systems infrastructure, or directly to End-Users as operational ready CIS products, tools and/or Decision Support Systems.

- **Activity 5.1 (Lead Execution Entity - SPREP): Improve understanding of large-scale climate processes influencing variability and extreme events** such as the El Nino Southern Oscillation (ENSO) and South Pacific Convergence Zone (SPCZ) to improve reliability and utility of CLEWS, seasonal forecasts and multi-decadal projections.

Deliverables (Output#1-6):

- New model data and analysis on ENSO (and other large-scale climate processes) impacts on regional-scale climate variability and extreme relevant to Vanuatu
- CIS-based communication and knowledge products on interdependencies between ENSO (and other large-scale climate drivers), climate variability and extremes of relevance to Vanuatu
- Ground-truthed CIS outputs and final outreach with/to target Next/End-users

- **Activity 5.2 (Lead Execution Entity - VMGD): Develop new, and enhance existing multi-hazard (impact-based) Climate Early Warning Systems (CLEWS)** tailored for priority sectors, with emphasis on multi-hours/days forecasting of tropical cyclones, and where appropriate other climate variables including extreme temperature floods, and coastal hazards (e.g. waves, storm surge).

Deliverables (Output#1-6):

- New/operational CIS-based CLEWS for each of five priority sectors across six climate hazards and customized to inform relevant response mechanisms across target Next/End-user network; data sourced from relevant VMGD databases/portals via IT-based interface systems
- Specific CLEWS links operationalized through existing/enhanced VMGD/sectoral communications network linked to existing NGO-based disaster response systems, including proposed new provincial Climate Change Community Centres
- Ground-truthed CIS outputs and final outreach with/to target Next/End-users

- **Activity 5.3 (Lead Execution Entity - VMGD): Improve utility and functionality of existing seasonal climate impact forecasts** with emphasis on integrated downscaled (statistical, dynamical and hybrid) forecast methods up to 7-9 months where technically feasible for tropical cyclones, rainfall, drought, sea level and coral bleaching risk.

Deliverable 5.3 (Output#1-6):

- New sector-specific seasonal 'impact' forecasts out to 7-9 months initially; potentially with option for new multi-week forecasting capability subject to concurrent Australian Bureau of Meteorology developments
  - Automated CliDE data interface to seasonal forecast modelling platforms where appropriate
  - Impact forecasts customized to key sectoral risks around selected climate variables, including extreme rainfall and wind (i.e. storms, tropical cyclones), drought and extreme heat/fire weather, extreme sea levels and coral bleaching
  - Multiple seasonal downscaled datasets for key climate variables (statistical, dynamical and hybrid - subject to forecast skill of available modelling/analysis systems)
  - Ground-truthed CIS outputs and final outreach with/to target Next/End-users
- **Activity 5.4 (Lead Execution Entity - VMGD): Develop and provide downscaled (< 20Km grid size) multi-decadal projections for temperature, rainfall, drought, tropical cyclones, sea level anomalies and coral bleaching risk**, where technically feasible, from existing CMIP5 GCM outputs, taking into account national/sub-national topographies and micro-climates, and supported by guidance on uncertainties, confidence and relevance of different downscaling and alternative methods (including statistical, dynamical and/or combinations thereof), for developing finer scale projections; emphasis on climate vulnerable 'hot spots'. Access to back-office high speed computing infrastructure and in-country observed station climate data are critical requirement.
 

**Deliverables (Output#1-6):**

    - Downscaled data from regionally specific (national) GCM multi-decadal projections for relevant micro-climates at finer spatial scale in Vanuatu for key climate variables using most applicable methodology
    - Downscaled projections collated and validated for informing sector-specific application-ready data sets
    - Ground-truthed CIS outputs and final outreach with/to target Next/End-users
  - **Activity 5.5 (Lead Execution Entity - VMGD): Develop tailored, application-ready climate projection data sets** through the *Vanuatu Climate Futures* web tool (see also Sub-Component 3.2) for use in climate vulnerability/impact assessments for relevant sectors. Access to back-office high speed computing infrastructure and in-country observed station climate data is a critical requirement.
 

**Deliverable 5.5 (Output#1-6):**

    - Application of observed data sets to existing regionally specific (national) multi-decadal projections (direct GCM and downscaled where appropriate) for Vanuatu for relevant climate variables (hazards) for each of five priority sectors
    - Collated, quality controlled and transformed data sets from existing VMGD databases and portals customized to specific Next/End-User needs (e.g. climate smart design specifications for infrastructure building codes and roads/drainage systems, coastal development planning, integrated coastal zone management, disaster risk reduction planning etc) subject to case study priorities
    - Analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate)

- Incorporation of supplementary 'citizen science' data where appropriate to ground-truth baseline bathymetry and topography
- Ground-truthed CIS outputs and final outreach with/to target Next/End-users

- **Activity 5.6 (Lead Execution Entity – VMGD): Develop (risk assessment-based) extreme sea level probabilities and coastal inundation impact hazard maps for 'hot spots'** to estimate coastal inundation risk and identification of vulnerabilities for a range of sectors as part of relevant CLEWS and longer term adaptation and disaster management planning. This will involve applying relevant techniques, models and in-situ observations and an appropriate modelling platform. Outputs are designed to inform risk assessments for sector specific climate change action plans and disaster risk reduction plans; emphasis on climate vulnerable 'hot spots'. Access to back-office high speed computing infrastructure and in-country observed station climate data is a critical requirement.

**Deliverables** (Output#1-6):

- Extreme sea level (coastal inundation) risk probabilities based on regionally specific (national) and downscaled (sub-national) multi-decadal projections for Vanuatu determined to underpin application-ready data sets
  - Collation, quality control and transformation of relevant data sets from existing VMGD databases and portals customized to specific Next/End-User needs (as input to application-ready datasets)
  - Analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate)
  - Incorporation of supplementary 'citizen science' data where appropriate to ground-truth baseline bathymetry and topography
  - Ground validated CIS outputs and final outreach with/to target Next/End-users
- **Activity 5.7 (Lead Execution Entity - SPREP): Undertake hydrodynamic assessment of coral reef 'health' and vulnerability to the slow-onset impacts of ocean warming and acidification** through analysis, reporting and CIS application of regional and downscaled climate models and relevant real-time climate and ecosystem observations; identify trigger points and associated metrics to inform management options at national and local community levels. Coral reefs and associated inshore fisheries are a critical resource supporting coastal communities through subsistence fishing, recreational fishing, diving and tourism and marine farming and stock enhancement (e.g. sea cucumber). These reefs also provide critical protection from wind generated waves and associated storm surge and coastal inundation events. The loss and damage of inshore coral reefs represents a significant risk to Vanuatu which needs to be addressed in part with more informed CIS evidence-based decision-making at both government and local community level. This activity will integrate with other Activities involving support for Community Climate Change Centre, spatial mapping of vulnerable coastal zones (including LIDAR, satellite imagery and ground-truthed citizen science assessments to facilitate an integrated ecosystem-based approach to coastal zone modelling and assessment. Access to back-office high speed computing infrastructure and in-country observed station climate data are critical requirements.

**Deliverable 5.7** (Output#1-6):

- Estimated return periods on multi-decadal time scales using regionally specific (national) and/or downscaled GCM projections for Vanuatu for coral bleaching events based on coincidence of extreme

SSTs and ocean acidification levels; to inform risk assessments for sector specific climate change action plans; emphasis on climate vulnerable 'hot spots'

- New indices of coral reef-based ecosystem health as performance criteria for monitoring and management coastal reef and inshore fishery resources as quantifiable metrics and 'trigger points' for risk-based approach to integrated coastal management planning
- Analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate)
- Incorporation of supplementary 'citizen science' data where appropriate to ground-truth baseline bathymetry and topography
- Ground validated CIS outputs and final outreach with/to target Next/End-users

- **Activity 5.8 (Lead Execution Entity - VMGD): Develop and apply agro-met services utilizing climate information for climate smart decision-making in agricultural sector** at a provincial- or national- level to be incorporated into the web-based DSS (see also Sub-Component 3.5 and 4.4).

**Deliverables** (Output#1-6):

- New algorithms and models using agro-data collected from multiple long-term field surveys for individual crops and climate data from near weather stations to produce agro-met index-based crop phenology and yield outlook, optimum planting and harvesting dates, and climate smart irrigation information
- Optimal farming decisions based on the comprehensive analysis of crop responses to climate variabilities (short-term to long-term) through field surveys and knowledge products from stakeholder surveys, literature reviews, traditional knowledge, and expert consultation
- Tailored downscaling methods of seasonal climate forecast (1-6 months) to feed algorithms and models in the agro-met services
- Field trials where appropriate to experiment/validate climate smart irrigation or crop phenology and yield estimation from the algorithms and models developed
- Coupling methods to incorporate the models into the DSS system for user-friendly, scenario-based simulations, subject to availability of locally-validated crop simulation models (APSIM or DSSAT),
- Ground-validated CIS outputs and final outreach with/to target Next/End-users

## Component 6 Project Management & Development

The two Execution Entities (SPREP and VMGD) will coordinate implementation of the activities according to a detailed work plan to be developed during the formal Inception Phase (first 3 months) of the Project.

- **Activity 6.1 (Execution Entities SPREP and VMGD): Project Management and Governance.** The coordination and delivery of all activities will be managed by the two Executing Entities (SPREP and VMGD) through dedicated Project Management Units. SPREP and VMGD PMUs will be responsible for day-to-day activity delivery, coordination and administration, work-plan development and management, management of activity budgets and reporting, procurement and coordination of partners and stakeholders, financial, activity and milestone accountability risk management and so on. SPREP and VMGD will be responsible for undertaking these management responsibilities to ensure effective and coordinated delivery of activities, according the assigned activity responsibility (as detailed through-out this Section).



The VMGD PMU will incorporate Sector Coordinators from each of the priority sectors who will play a critical role in supporting delivery of sector specific activities and sector based CIS mainstreaming.

The first three months of the project will be an inception period where detailed work plans are developed and agreed, and where possible sub-contracts and coordination of activities with partners is established. Both VMGD and SPREP will also be responsible for managing broader governance arrangements including:

- SPREP PMU to coordinate key partners and stakeholders (particular at the regional level) via a Regional Partners Steering Committee, involving Vanuatu (VMGD), the SPREP Pac Met Desk, and key Pac Met Desk Regional Partners (including WMO, CSIRO, BOM, APEC CC, SPC and USP). The SPREP Project Manager will be responsible for coordinating meetings in person and/or via video link on quarterly/semi-annual (or as needed) basis throughout the term of the project, to be aligned where possible with relevant in-country project activities. The committee will have a particular focus on ensuring coordinated delivery of activities for which the SPREP Project Manager is accountable, and which have implications for CIS at the regional scales. This will include consideration of concurrent sub-regional development by the WMO and/or other national governments of complementary radar-based CLEWS within neighbouring Melanesian PICs to ensure appropriate systems integration to operationally enhance spatial and temporal coverage, functionality, reliability and cost-effectiveness and efficiency. Such developments at the sub-regional scale will also provide opportunities for supporting capacity development through skills-based training and technical support.
- VMGD PMU will lead on coordination and oversight of the National Project Committee who will provide oversight and coordination and support for effective delivery of VMGD led activities. The National Project Committee will include target sector representatives (as well as sector coordinators) as well as representation from the Regional Partners Steering Committee (SPREP and partners where required). The National Project Committees will meet on a quarterly/semi-annual basis, face to face in Vanuatu.

Further detail on governance arrangements is provided in Section C 7 of this proposal

#### C.4. Background Information on Project / Programme Sponsor (Executing Entity)

##### SPREP

The Secretariat of the Pacific Regional Environment Programme (SPREP) is an intergovernmental agency that provides assistance and technical advisory services to Pacific Island countries, territories and administrations across climate change, ocean, biodiversity and ecosystem, waste and governance thematic areas. SPREP is a regional center of excellence and the lead Pacific organization in climate change and meteorology work. It has implemented over 100 donor-assisted regional/country projects in climate change and environmental management. SPREP is currently working with the Government of Japan, Samoa and regional partners on the development of a new Pacific Climate Change Centre, which will serve as a hub for regional climate change information, training and service delivery, including with a focus on climate finance support and delivery. SPREP

is also host to the Pacific Meteorological Desk – a focal point for technical support and coordination of meteorological and climate information for the Pacific.

SPREP supports and is accountable to 21 Pacific island country and territory Members and 5 developed country Members<sup>8</sup>. SPREP has a current staff of more than 90, with at least 20 devoted to working full time on climate related issues, though it does adopt climate change as the cross cutting issue and so all thematic divisions deal with the issue. SPREP has annual programming budget of around \$US 20 million, sourced from annual Membership fees, bi-lateral funding agreements and project grants.

SPREP is managed by a Senior Management Team headed by the Director General who ensures delivery as per the Agreement Establishing SPREP and the SPREP Regulations established and maintained by Members. Notably, SPREP has established a Project Review and Monitoring Group (PRMG, headed by the Deputy Director General (DDG)) as a collection of relevant technical, financial and human resource expertise across the agency to support and advise on the design, delivery and monitoring of projects. The PRMG along with the SMT will play key roles in delivery of SPREP as the accredited entity for this and other GCF projects, ensuring monitoring, reporting, and financial management obligations and responsibilities are fulfilled.

In line with the SPREP regulations SPREP has established an overall Operations Manual and Financial Procedures Manual which integrate SPREPS range of project management and financial management processes and procedures. SPREPs administrative capacity is also support by the Financial Management and Information System and Project Management Information System (online platforms) through which this project will be management. SPREP also has a Communications and Outreach Unit, maintains a website and social media presence and hosts and maintains the Pacific Climate Change Portal.

SPREP was accredited to the GCF in March 2015

#### VMGD

The VMGD is a government department of the Ministry of Climate Change, Meteorology, Geo-Hazards, Energy, Environment and Disaster Management. The VMGD strategic direction and governance arrangements are outlined by the *Vanuatu Meteorology and Geo-Hazards Department Strategic Development Plan 2014-2023*. VMGD carries out all weather and climate data analysis, monitoring and forecasting for Vanuatu. The Climate Division of the VMGD is responsible for climate data collection, database management, seasonal forecasting, technical analyses and climate change assessments for Vanuatu.

VMGD currently has over 89 staff, with 7 divisions Weather Forecasting and Services Division, the Climate Change and Disaster Risk Reduction Division, the Geo-Hazards Division, Observations Division and the Information, Communications and Technology and Engineering Division, and the Climate Division, which is also home to the VMGD Project Management Unit. VMGD also co-chairs the National Advisory Board on Climate Change and Disaster Risk Reduction (NAB) along with the National Disaster Management Office (NDMO).

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<sup>8</sup> Australia, New Zealand, France, the United Kingdom of Great Britain and Northern Ireland, United States of America

The VMGD budget allocation is more than Vatu 100'000'000 (approx. 1million) annually and growing every year as projects are rolled out and VMGD allocates budget to absorb project activities to ensure the element of continuity. Additionally, financing through Government recurrent budget for the Ministry of Climate Change in support of VMGD's efforts is projected to increase by Vatu 20'000'000 from 2017 to support the national climate change process by establishing a Department of Climate Change which will add further strength to the GCF initiative.

As a government agency VMGD is subject to the legislative requirements and administrative protocols and standards of the Ministry and the Vanuatu Government more generally. The Administrative Division of the VMGD provides the requisite leadership and corporate management and administrative structures for the operations of the Department to meet the requirements of the Ministry and the Government.

VMGD is headed by the Director of VMGD, who is accountable to the Director General of the Ministry of Climate Change, Meteorology, Geo-Hazards, Energy, Environment and Disaster Management. The Director General is also co-chair of the NAB which facilitates and endorses the development of new DRR & CC programs, projects, initiatives and activities, and acts as a focal point for information - sharing and coordination on CC/DRR, as well as guides and coordinates the development of national climate finance processes<sup>9</sup>.

The PMU is currently around 20 staff and has been established within the VMGD to coordinate implementation of donor financed, climate change projects (for example through EU, the World Bank, UNDP, AusAID). The PMU is responsible for overall project management including: procurement; planning; budgeting; supervision; financial management; and maintenance of the project accounts for donor financed projects under the authority of the National Advisory Board on Climate Change and Disaster Risk Reduction (NAB). The PMU works closely with several sectoral agencies that are directly responsible for implementation of technical project components. This project will benefit from being hosted by the Climate Change division along with the VMGD PMU (i.e the Project PMU will sit alongside / integrate with the VMGD PMU)

VMGD, along with all Government Agencies deliver projects in accordance with various donor requirements through established national systems. All projects are managed through the Government Financial Management and Information System (FMIS). The PMU has adopted the Financial Management and Procurement rules of the World Bank in the execution of its functions. These include an Aid Coordination system that registers, codes and authorizes expenditure. Additionally the Government has a well-established financial management system to facilitate the management of recurrent Government financial resources and particularly financial resources from donor funded projects. The EU, AusAID and other donors inject direct budget support to the Government of Vanuatu through this financial management system.

The NAB website <http://www.nab.vu/> will serve as a high visibility platform for communicating this projects' objectives and progress.

### C.5. Market Overview (if applicable)

*Describe the market for the product(s) or services including the historical data and forecasts.*

Delivery of CIS is purely a public good in PICs at this time and there is no CIS market, so: not applicable

*Describe the competitive environment including the list of competitors with market shares and customer base and key differentiating factors (if applicable).* Not applicable

*Provide pricing structures, price controls, subsidies available and government involvement (if any).* Not applicable

### C.6. Regulation, Taxation and Insurance (if applicable)

*Provide details of government licenses or permits required for implementing and operating the project/programme, the issuing authority, and the date of issue or expected date of issue.* Delivery of the project in Vanuatu will not require the granting of any government licenses or permits (such as development permits) Formal permission is required from partner PICs (including Vanuatu) to access national climate data records. This permission will be sought through existing channels via the SPREP Pacific Meteorological Desk Partnership /Pacific Meteorological Council and Vanuatu Climate Change focal points to access these data as part of the programme inception phase. In this context it should be noted that the Vanuatu Government is a co-Lead Execution Entity with SPREP with the focal point being the VMGD, which in turn is the responsible agency in Vanuatu for managing national climate data. *Describe applicable taxes and foreign exchange regulations.* Not applicable *Provide details on insurance policies related to project/programme.* Not applicable

### C.7. Institutional / Implementation Arrangements

A project governance structure will be established, integrating with the broader management structure of the two entities, SPREP and VMGD, described in Section C4 above.

SPREP, as the Accredited Entity will assume overall responsibility for delivery of the project. As such it will monitor and evaluate the projects in terms of activity delivery and financial management and provide reports to the GCF, consistent with expectations set out in the Accreditation Master Agreement (AMA). SPREPs function as the accredited entity will functionally be carried out by the Project Review and Monitoring Group (PRMG, headed by the Deputy Director General), who will provide advice and recommendations to the SPREP DG, as the authority for action as undertaken as part of the AMA (and associated Funded Activity Agreements (FAA)

The SPREP Director General will authorize project activities to be delivered by the Director of VMGD and the Director of Climate Change of SPREP, including via a Execution Partner Agreement with VMGD. Both directors will be required to provide relevant reports to the Director General, via the PRMG, as required by the AMA/FAA

During the design processes activities were allocated to the respective Executing Entities based on comparative advantage and capacity. Each of the Executing Entities will work through linked governance arrangements to ensure coordinated delivery of activities. A Joint Work Plan between SPREP and VMGD will be established to support this.

The various project delivery stakeholder parties and implementation and governance structure is described and illustrated below:

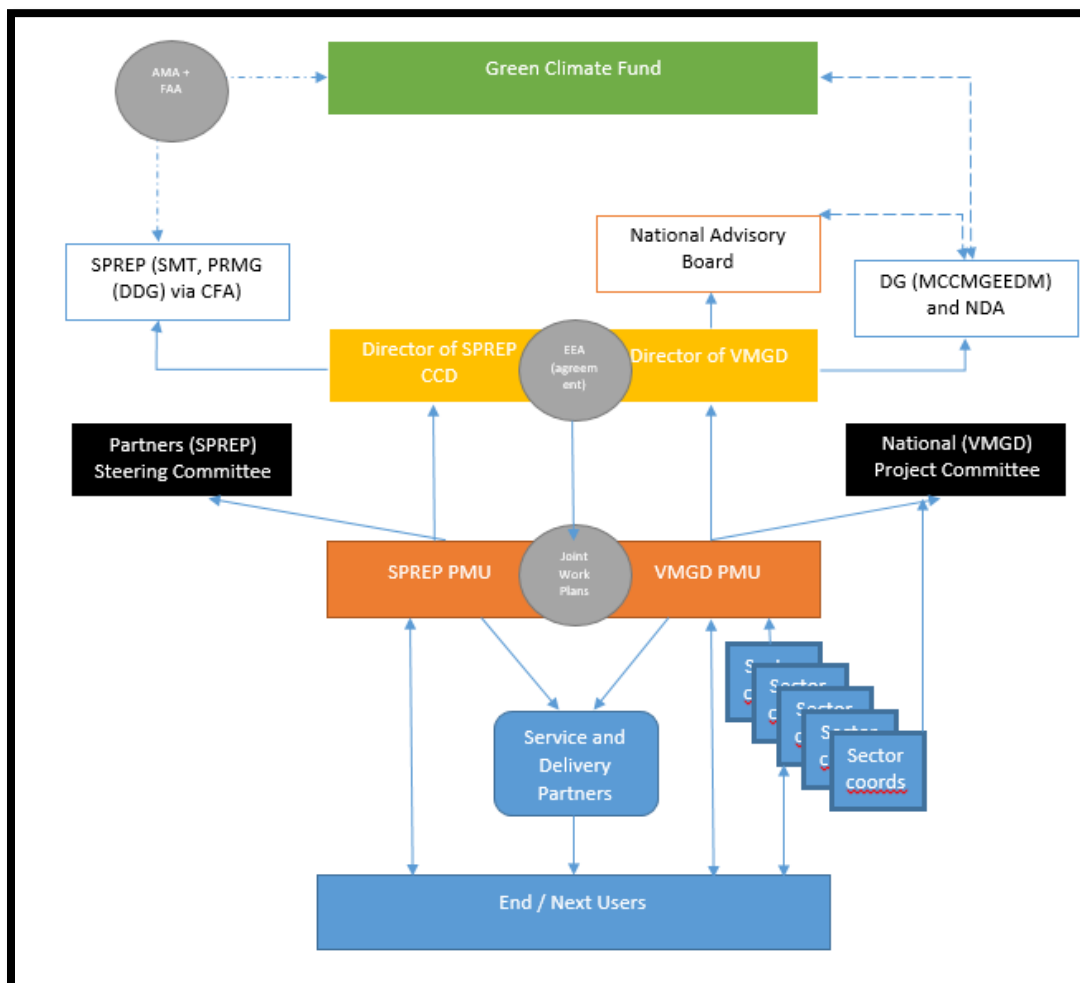
- **The Green Climate Fund** will oversee delivery of the project to the extent determined by the Accreditation Master Agreement between the GCF and SPREP, and the associated Funded Activity Agreement. It is through the AMA that the GCF has an ongoing relationship with SPREP more broadly,

represented through the Director General (SMT)). GCF will flow funds to the SPREP GCF Account, on an annual basis.

- **SPREP** as the accredited entity will take overall responsibility for overseeing delivery of the project as set out in the AMA/FAA with the GCF. This responsibility will sit with the Deputy Director General as the chair of (and with support from) the SPREP Project Review and Monitoring Group (PRMG), which is able to provide impartial and comprehensive technical and administrative oversight for the project. SPREP will flow funds from the SPREP GCF account to the Vanuatu Department of Finance on a semi-annual basis, pending provision of required financial reports. SPREP will also directly flow funds to the SPREP PMU account, for activity delivery as per the SPREP Financial Procedures.
- **VMGD (Director of VMGD)** will manage responsibilities under the EEA with SPREP. The Director will oversee and monitor project activity delivery by the Project PMU, and with support from the VMGD PMU. The Director will be accountable to both SPREP under the EEA as well as the Director General of the Ministry of Climate Change Adaptation Meteorology, Geo-Hazards, Environment, Energy and Disaster Management, and the Vanuatu NAB on Climate Change and Disaster Risk Reduction who provides oversight to all relevant projects in terms of financial expenditure and coordination with national sector development priorities. The VMGD Director will seek project funds for activity delivery, from the Department of Finance following standards procedures (as detailed in Section F4 below).
- **SPREP PMU (through the Director of Climate Change)**: Responsibility for day-to-day delivery of the project will sit with the Director of Climate Change who will oversee the activities and performance of the Project PMU. The Project PMU will report to the Director of Climate Change according to a detailed joint work programme. The SPREP PMU will be flowed funds (from the GCF holding account) through the approval authority of the Director General (via the PRMG chair, the DDG), as per requirements of the FAA and AMA, for activity delivery according to the disbursement schedule, activity and milestone reporting and verification. The PMU and (Director) will also service the Executing Entity Agreement (EEA) between SPREP and the Government of Vanuatu via the VMGD. The EEA will establish arrangements for the flow of funds from SPREP (as accredited entity) to VMGD (via the Ministry of Finance) according to the detailed disbursement schedule, and pending activity and milestone reporting and verification. The SPREP PMU will work closely to also coordinate reporting from the VMGD PMU, as per the EEA.
- **VMGD Project PMU** will be established to coordinate delivery of the designated activities. The VMGD *Project* PMU will be located within the broader VMGD PMU in the Climate Change Division (and work to the Director for VMGD, according to a detailed joint work programme). The VMGD *Project* PMU will provide day to day project management oversight and coordination for the 5 sectoral coordinators (based within the five priority sector agencies), who in turn will provide day to day oversight and coordination of relevant project CIS activities within each of the priority sectors, including coordination of ‘case studies’, with emphasis on facilitating communications, knowledge brokering and overall CIS mainstreaming.
- **The Regional Partners Steering Committee** will be established and coordinated by the SPREP PMU and chaired by the SPREP CCD Director. The Committee will include key Pacific Met Desk Delivery Partners including CSIRO, BOM, WMO, APEC CC, and other CROP agency partners (SPC and USP), as well as the Director of VMGD (on behalf of the VMGD PMU). The committee’s responsibilities have been outline in Section C4 and in summary will involve providing broad strategic oversight, direction and

technical advice, particularly in relation to activities being delivered by SPREP. Where appropriate and as to be determined through the project inception phase the Pac Met Desk Delivery Partners may also be called on, by SPREP, to lead delivery and/or coordination of specific activities.

- **The National Project Committee** will be established by the VMGD Director/ Project PMU and will be responsible for coordination and oversight of activities being delivered by VMGD (as well as SPREP) PMUs. The committee will include the VMGD PMU, SPREP PMU representative, national priority sector coordinators and representatives. Other relevant partners will be called on as appropriate
- **Service and Delivery Partners** will be established via transparent procurement and other partnership arrangements as appropriate and allowed by / consistent with the (GCF reviewed and approved) SPREP Procurement Policy. In some instances, and as to be determined through the Inception Phase of the project key partners will be engaged via SPREP through allowed partnership arrangement processes, such as via existing MoU arrangements.



**Figure 7:** Implementation arrangements and relationships between various project stakeholders

*Describe construction and supervision methodology with key contractual agreements.*

All designated partners of the project(s)/programme will be subject to legally binding terms and conditions of relevant sub-contracts for purpose of delivering products and services as part of the agreed scope of work and in turn consistent with terms and conditions of the AMA between the GCF and SPREP. As also described above SPREP will establish an Executing Entity Agreement with VMGD.

*Describe operational arrangements with key contractual agreements following the completion of construction. If applicable, provide the credit analysis of key counterparties of key contractual agreements and/or structural mitigants to cover the counterparty risks. Not applicable at this stage*

### **C.8. Timetable of Project/Programme Implementation**

*The project is scheduled to commence in April 2017 and close by 30 June 2021 (4 years 3 months)*

*See Annex XX for detailed timetable.*

### D.1. Value Added for GCF Involvement

The GCF has been established under the UNFCCC as a key financing mechanism for initiatives which promote and achieve low carbon and resilient development. In its own words: *Given the urgency and seriousness of this challenge, the Fund is mandated to make an ambitious contribution to the united global response to climate change.* The proposal, as set out here, aims to strengthen the use of evidence / science based climate information in the development process to support resilient development. The proposal is both ambitious (in its intended outcomes), and correspondingly transformative (in establishing sustained and cross-cutting truly evidenced based climate resilient development at national and community levels). The case has been made for the return on such investments (which will be measured through implementation). These and other features of the proposal align it closely with the ambition, scope and objectives of the Fund.

There are presently no financial instruments available within the Pacific SIDS to provide support for such a body of work at the requisite scope and scale to address key information gaps and capacity needs of stakeholders. Support through the GCF provides an opportunity to develop and connect CIS directly with user needs in a targeted manner to underpin effective adaptation. With the completion of the previous PCCSP/PACCSAP programs and the pending close-out of COSPPac, significant CIS-related data, information, tools and associated IP have been created, however there is no ongoing support from any donor for this work specifically to continue in the Pacific SIDS for purposes of application at the sectoral and local community level, other than somewhat ancillary support on a limited/ad hoc basis /from other donor-funded activities.

Given the 'public good' nature of the project, there is very limited scope for private sector investment in such projects, particularly in the Pacific where the private sector is also of limited scale and capacity. Therefore it is up to national government agencies like VMGD, regional agencies like SPREP, and global partners like the GCF to recognize the value of such investments, on behalf of vulnerable communities and development stakeholders, and take action.

There are also limited resources in the Pacific presently to facilitate such an applied process for science informing services and for using CIS to meet end-user needs for adaptation planning and disaster risk reduction purposes. Specialist technical expertise is also limited in partner PICs, and the collaborative approach to be adopted involving partner PICs (through the intended development of the regional CIS programme), regional organisations and other partners will ensure that all requisite capabilities are available in a way that can also leverage off knowledge and resources of relevant existing programs. Apart from PCCSP/PACCSAP and COSPPac, these programs include the Australian Climate Change Science Programme, the Natural Resource Management „Climate Change in Australia“ programme, and the Earth Systems and Climate Change Hub of the new National Environmental Science Programme. In this context, GCF involvement provides the means by which CIS tailored specifically for the Pacific can be used to promote sustainable, climate resilient development in Vanuatu and other partner PICs.

In relation to the PCCSP/PACCSAP science program specifically, this was deliberately designed and implemented as a regional program, with the primary objective of increasing scientific understanding of climate variability, extremes and change in the western tropical Pacific. Key stakeholders, although not



exclusively so, were the partner PIC NMSs and regional organisations (including SPREP, SPC and USP). This was in the context that prior to PCCSP/PACCSAP there was limited such knowledge and that most stakeholders were coming from a very low baseline. Whereas PCCSP/PACCSAP was substantially successful at generating a considerable and credible cohort of new science based climate knowledge complete with a range of purpose built communication products and research/management tools for the Pacific, including nationally relevant climate projections data consistent with IPCC processes, there was limited scope for end-user engagement for development of sector specific science information for policy and planning. In particular, limited support was available for partner PIC NMSs to engage with sectoral stakeholders to communicate this knowledge and to translate it into applied, on-ground actionable knowledge by end-users. This GCF program will provide country, site and sector specific science and complement the regional work of PACCSAP.

## D.2. Exit Strategy

There are no specific financial (as distinct to economic) returns associated with the project (other than fee-for service charges the VMGD may look to apply in the future) and so upon completion, for the outputs and outcomes to be sustained and maintained (and even replicated and broadened) the project needs to adopt a strategic approach to build demand and understanding (and demonstration of the value) of CIS. A summary of design and implementation strategies which will support ongoing development and use of CIS upon project completion is provided below. Delivery of these strategies, and the sustainability of the project outcomes generally is underpinned by VMGD's commitment to build capacity and resources to sustain the operations, products and services beyond the project closure (see annexed letters of commitment) For operations and resources provided by SPREP, the sustainability of these will rely on the demand-driven nature of the services and SPREPs own budget prioritizing decisions. Confidence for the ongoing delivery of CIS services at the regional level from SPREP is reflected in the establishment of the Pacific Climate Change Centre from 2018. The PCCC will be a hub for meteorological services and support for the region, with support from a range of partners<sup>10</sup>.

- A key strategy of the project is to embed sector coordinators in relevant sector agencies to assist with the development and application of CIS in key sector policy, planning and project processes. This approach has several possible benefits: It is anticipated that the presence of the coordinator becomes seen as an invaluable resource within the sector agency, and ongoing resourcing for such a position or capacity is prioritized; the sector coordinator will enhance the functional relationship between VMGD and the sector and establish an enhanced institutional level partnership and mutually beneficial relationship; and finally and underpinning the above through development and demonstrated value of the 'case studies' a demand for ongoing use and development of sector specific CIS will be created. Similar demand is expected to be created through the next/end user value chain, through to community decision makers.
- An additional key strategy of the project is to establish Climate Change Community Centres in each of the five provinces of Vanuatu to facilitate the communication and outreach of CIS to local communities. These Centres will be supported with funding to re-fit existi and/or construct new facilitates to house CIS 'collateral' such as poster, brochures, fact sheets, videos etc. They will also be equipped with IT support such as a PC and internet connection, mobile phone(s), warning sirens and emergency power where appropriate to supplement existing such resources. The centres will provide a focal point for

<sup>10</sup> As per the PCCC business plan which can be provided to the GCF upon request.

dissemination of CIS and training to build capacity; the latter will be in association with ‘citizen science’ groups who will be recruited to help collect local ground-truth data on mapping of key natural resources (e.g. coastal mapping) and infrastructure (eg. Roads, bridges, public buildings etc). The suite of community-based CIS including such things as sector specific short videos will be developed and implemented on a participatory basis with local communities and NGOs through these Centres, and thereby build local capacity on a sustainable basis.

- Where at all practically possible, all CIS generated and used by the project will be based on open-source format with appropriate data and information management arrangements in place to facilitate security, discoverability and accessibility to all IP. This approach is expected to build a CIS Community of Practice (CoP) at a national level across the region leveraging increasingly off enhanced national and regional organization CIS capacity, with the coordination and support role increasingly transitioning to the Pacific Climate Change Centre (PCCC) based at the SPREP campus in Apia.
- The intended development of the Pacific, multi-country CIS for resilient development programme (Pac-CIS-RDP) also underpins the sustainability of any single (sub) country project. Through the planned staged approach 2 PICs (sub) projects will run concurrently at any one time allowing for an orderly transition of capability and effective and efficient transfer of knowledge between countries and stakeholders across the region over time to avoid overwhelming otherwise time-poor stakeholders with multiple demands for input to activities. The CoP approach operating concurrently at both regional and national level will ensure partner PICs will continue to benefit from an established Science Technology and Innovation pathway in development and application of new and enhanced CIS beyond specific national projects i.e. all partner PICs will become part of a ‘alumni’ of CIS project participants through the CoP approach.
- The CoP would be supported by the PCCC including SPREPS technical partners including CSIRO, BoM, universities and other agencies, and the Pacific Meteorological Desk Partnership at SPREP and the Pacific NMSs, with further support from regional organisations including SPC and USP.
- The CoP will facilitate the ongoing dissemination of relevant CIS-based knowledge on a coordinated basis through the PCCC underpinned by relevant national portals and the SPREP Pacific Climate Change Portal.
- The Pacific Climate Change Portal will provide the platform on which all project/programme outputs will be managed in a secure, discoverable and accessible way, with the CoP and the PCCC providing the technical capability to ensure that CIS continue to be developed in an innovative manner and that end-users are provided the appropriate ongoing support to access, understand and utilize the CIS appropriately for decision-making in adaptation planning. The scope of work also features activities designed to enhance institutional arrangements in Vanuatu and partner PICs to facilitate mainstreaming of CIS as an ongoing mechanism for informing climate adaptation and disaster risk reduction policy development, planning and associated decision-making.

In relation to new infrastructure, procurement, installation and maintenance will be incorporated into the existing infrastructure management, planning, procurement and maintenance arrangements for the VMGD according to existing Vanuatu Government standard operating procedures and protocols. These arrangements will include during and post-project arrangements to ensure ongoing sustainability.

## **E.1. Impact Potential**

Potential of the project/programme to contribute to the achievement of the Fund’s objectives and result areas

### E.1.1. Mitigation / adaptation impact potential

The project will directly contribute to removing barriers, building capacity and supporting delivery and application of CIS for resilient development. The project will support actions which directly and indirectly result in more resilient development at national, provincial and community levels. The potential for the project to contribute to the achievement of the GCF's objectives and result areas is detailed in Section H1 (Logical Framework). The Project will contribute to the GCF Adaptation Impact: **Contribution to increased climate resilient sustainable development**. In particular the project will contribute to the GCF Assessment Criteria as described below:

The **Expected total number of direct and indirect beneficiaries, (reduced vulnerability or increased resilience); number of beneficiaries relative to total population** is estimated to be 173,820 (60%) and 86,910 (30%) from a total population of 289,700 across the 6 main island groups. It is anticipated that women will constitute at least 55% of the total beneficiaries, based on the vulnerability of women in the target sectors, for example agriculture.

Numbers of beneficiaries will be validated/complimented through the proposed SEB analysis (Section C.3 Sub-component 3.6) which will transform population-wide statistics at national to household level into relevant triple-bottom line surrogate metrics measuring CIS impact. Relevant GCF 'impact' assessment factors against which the contribution to climate resilient sustainable development can be understood (as per the GCF Investment Criteria) are listed below:

- **Degree to which the activity avoids lock - in of long - lived, climate - vulnerable infrastructure**

The project may directly support decision-making which avoids locking in plans for/development of climate vulnerable infrastructure. The project will do this by supporting CIS mainstreaming into key Infrastructure policies and guidelines. This project will focus on key climate-sensitive sectors in Vanuatu and other PICs, with emphasis on working directly with sectoral end-users and local communities to enhance access to and use of CIS for informing climate-related planning, policy development and associated decision-making. This will be achieved through enhanced CIS-based risk assessments informing development of climate smart building codes for housing and public amenities such as roads, bridges, drainage systems, public and private transport, ports/harbours, airports etc. To this end, the CIS case study on the infrastructure sector in Vanuatu will play a pivotal role as part of the project in ensuring that future infrastructure developments in Vanuatu are climate proof. Examples for consideration as part of this case study may include (but not otherwise be limited to) the development of new roads and drainage systems in Vanuatu as part of the existing ADB funded Port Vila Urban Re-Development Project which is drawing in part from the PACCSAP funded Vanuatu Climate Resilient Road Standards Project (2014). Multi-lateral Development Banks which typically investment in major infrastructure works in partner PICs, such as ADB and World Bank, are in fact a target Next-user group identified as part of this project for this very reason.

- **Increase the generation and use of climate (and required associated) information in decision making**

The Project will directly support generation of and application of CIS in decision making, in at least 5 sectors through key development policy, planning and project processes. A comprehensive suite of tailored CIS products and services will be developed in partnership with target Next/End-users, and deployed in real-time operational situations across the five priority sectors as part of the case studies. These case studies will operate throughout the life of the project and provide the framework for ensuring that CIS is mainstreamed into the decision-making process by the key decision-makers themselves. All such Next/End-users will be supported through targeted capacity development which will be a combination of on-the-job training and mentoring, skills-based training, provision of on-line and hard copy training resources and guidance materials, real-time on-call access to an expert Help-Desk, and a comprehensive new cohort of applied, scientific and technically robust data, information and knowledge to underpin the new suite of CIS products and services. The project will also support the outreach of this new knowledge and these new CIS resources through targeted activities which extend beyond the national government and the five priority sectors to provincial governments and local communities; the latter with the additional support of dedicated climate change community centres designed to facilitate climate change communications and adaptation/disaster risk reduction response actions. These community centres will also provide a focus for enlisting 'citizen science' practitioners to collect ground-truthed data to supplement relevant databases and spatial mapping outputs; both existing and new data sourced through the project by both means. New and upgraded infrastructure will be deployed through the project by other means for purposes of collecting critical new data to support climatological, meteorological and oceanographic analysis (e.g. from LIDAR, satellite imagery, observational stations etc). The project will provide resources for ensuring that all CIS products and services are communicated in multiple formats/platforms (on-line, media, hard copy etc) and languages (English, French, Bislama) to ensure optimal coverage and thereby adoption for all target Next/End-users. The project design deliberately features a multi-disciplinary (including climatology, meteorology and oceanography) approach to addressing the CIS needs of multiple sectors across multiple time scales (near term – EWS; medium term – seasonal forecasts; long term – multi-decadal projections) underpinned by new knowledge and reliable systems and infrastructure in order to cover all key gaps, needs and associated risks and contingencies across the diverse stakeholder network.

- **Strengthen adaptive capacity and reduced exposure to climate risk**

The project will support the capacity of communities to plan for and make decisions on the best adaptation pathways, via training and resource support, such as CIS and planning decision support tools. The project will develop a suite of new CIS delivered through multiple formats/platforms tailored to the specific needs of target Next/End-users. The target groups have been identified through direct stakeholder engagement in Vanuatu as part of the preceding GCF Readiness Project. These consultations have identified existing CIS gaps, needs and associated capacity across five priority sectors in Vanuatu and across different levels of government and local community groups. The project has a dedicated Component (1.0) for capacity development, including the production of tailored training resources (skills-based CIS training and guidance materials in form of handbooks, on-line training etc) supplemented by professional post-graduate training for key VMGD specialists, on-the-job mentoring and Help-Desk support for decision-makers, and combined outreach and capacity development for local communities through support for Climate Change Community Centres and associated establishment of 'citizen science' capacity. The combination of targeted CIS support for these key Next/End-users will facilitate enhanced awareness of the risks of climate change and the need for climate related disaster preparedness. It will also thereby increase broad adoption of CIS at different levels of government and within

local communities to make better 'climate smart' decisions in relation to climate adaptation and disaster risk reduction. From another perspective, the project will provide support for critical new infrastructure to ensure effective communication of CIS, including under critical, emergency management conditions. In short, decision-makers that have enhanced CIS capacity and are 'better' informed through access to/use of best available CIS products and services, basically make 'smarter' decisions resulting in more resilient and sustainable development outcomes for the country.

- **Strengthen awareness of climate threats and risk reduction processes**

Strengthening awareness of climate risks and risk reduction processes is synonymous with strengthening adaptive capacity and reducing exposure to climate risk. In this context, these issues are addressed simultaneously in this project by ensuring the project design has a fully integrated portfolio of complementary activities incorporating aspects of CIS communications, knowledge brokering and outreach with target Next/End-users, as well as creation of CIS data, information and knowledge products and services. It follows that the project will raise awareness of climate threats and risk reduction processes with these target groups, but ore generally will also raise aware across the population of Vanuatu (all of which is potentially impacted by climate change and all of which is potentially impacted also by access to and use of CIS – either indirectly through target Next/End-user groups or by other more direct means). Direct methods of awareness raising for the broader population will be through enhancing existing Vanuatu Government community engagement mechanisms through the NAB and VMGD, including weather forecast and associated EWS platforms, as well as by producing new communication products such as sector-based short videos for general release through local media, schools, church groups and the proposed new Climate Change Community Centres. The latter will also be supported by engagement and collaborative partnerships with local NGOs through existing and future development projects funded by other donors.

Proxy or surrogate indicators of CIS impact based on triple bottom line (social, economic and environmental) metrics for Vanuatu at national, provincial and household level will be estimated through the proposed SEB analysis. The indicators will be used to inform change achieved as per the assessment factors outlined above, and as required in further detail by the Project Logic/ results framework in Section H

*When applicable, specify the degree to which the project/programme avoids lock-in of long-lived, high emission or climate-vulnerable infrastructure.*

Relevant information in relation to the proposed purchase of a Doppler radar installation for Vanuatu is provided in Section C.2, with relevant activities described in Section C.3 under Component 1.0/Sub-Component 1.7 and Component 4.0/Sub-Component 4.5. The investment in new infrastructure is otherwise limited to support for maintenance and operation of existing essential weather and climate observational stations and networks in Vanuatu for collection of critical data to underpin DSS tools and to inform decision-making. New agro-met monitoring infrastructure will be purchased for supporting the development of new climate sensitive agricultural crop models for enhanced impact forecasting. All such infrastructure will be incorporated into the existing management arrangements for the VMGD consistent with provisions of the existing VMGD Strategic Development Plan 2014-2023.

A LIDAR sensor will be purchased to modify existing SPC drone technology for internal (within project team) recording new high resolution LIDAR inshore bathymetry and coastal topography data as an alternative to the far more expensive option of out-sourcing LIDAR data collection via purpose-built light plane capability located in Australia. The drone LIDAR capability has the ability to be deployed in multiple countries/locations with limited overhead costs and utilizing existing/in-house software for collating, analysing and visualizing data. Ongoing maintenance will be the responsibility of the relevant Delivery Partner (SPC) for deployment as part of the Pac-CIS-RDP regional programme.

**E.1.2. Key impact potential indicator**

*Provide specific numerical values for the indicators below.*

GCF core indicators	Expected tonnes of carbon dioxide equivalent (t CO <sub>2</sub> eq) to be reduced or avoided (Mitigation only)	Annual	Not applicable
		Lifetime	Not applicable
	<ul style="list-style-type: none"> <li>Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience);</li> <li>Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)</li> </ul>	Total	Vanuatu population – 289,700 Indirect: 173,820 (Women 95,601) Direct: 86,910 (Women 47,801)
		Percentage (%)	Indirect: 60% Direct: 30% (Women 55% of total)

*Other relevant indicators*

Please refer to Sections E2 and E3 below and Logic (results) Framework (Section H) for further detail on the impact potential, and other result areas and the means for measurement and verification.

*Describe the detailed methodology used for calculating the indicators above.*

The estimated figures are conservative estimates based on the coverage of key project activities, including delivery of climate early warning systems, delivery of tailored CIS through community climate change centers, and the associated case study applications and their contribution to the investment / performance criteria /

indicators of the GCF. In reality, the quantification of beneficiaries from such a public good as CIS is problematic not least because the benefits of mainstreamed CIS into sector planning at national, provincial and community levels will deliver ongoing benefits for many years to come. An indirect beneficiary level of close to 100% could be justified based on the assumption that climate change impacts potentially every single citizen of Vanuatu in one form or another over time the CIS delivered through the project will ultimately benefit all citizens through reduced climate vulnerability and impact. The indicators have been estimated based on the following metrics:

- Total Population of Vanuatu: 289,700
- Indirect beneficiaries:
  - 60% is based on: an upper beneficiary limit (conservative) of the agriculture sector providing livelihoods for up to 60% of population and an assumption that most of the sector will benefit indirectly from the CIS products
  - Overlapping with this upper limit is likely catchment areas of climate early warning systems across the 5 main island groups with identified vulnerable (flood prone) catchment systems, with a total population of approximately 150,000
  - The 5000 jobs in the Tourism sector is also noted
- Direct beneficiaries.
  - 86,910 figure based on community climate centers (10) multiplied by a typical catchment size (2200) = 22,000 plus, which will provide as a minimum access to tailored CIS (and training/support materials) for adaptive capacity and more resilient decision making. The population catchment is based on the community visited during the GCF Readiness Project, Epau and the 6 surrounding villages which are party of the same district and are monitored by the NDMO through a similar systems.
  - Approximately 60,000 to directly benefit through use of early warning systems, including strengthened flood warning systems and other sector specific EWS

An additional 5000-6000 direct beneficiaries are expected to be captured (from outside the community centers and EWS) through

The methodology for calculating the indicators will be further strengthened and validated via refinement of the results framework during the inception phase of the project, as well through the outputs from project-based CBA activities under Sub-Component 3.6 (see also Section F.1 and Newth et al, 2016). These activities will be aligned and integrated with the sectoral case studies and the target Next/End-user groups as appropriate, but will also address requisite methodologies for assessment of cross-sectoral indicators at national/sub-national level in Vanuatu.

Outputs from the SEB analysis which is described in more detail elsewhere in this proposal, and in the annexed documents, will be supplemented by more qualitative analysis undertaken using other evaluation data collated from direct Next/End-user engagement through implementation of the project M&E plan. Such analysis will aim to validate impacts including as estimated through the SEB analysis and correlated with ground-truthed evidence from target Next/End-user groups, specified outputs and activities as summarized in Attachment 5a-e.

The initial stakeholder engagement, environmental/data scanning and programme design and work plan development undertaken during the initial three month inception phase will provide an initial assessment framework including specified KPIs and methodologies, after which the implementation of the monitoring and evaluation planning for the project/programme will provide feedback and scope for adjustment of indicators and associated assessment methodologies as circumstances dictate.

*Describe how the project/programme's indicator values compare to the appropriate benchmarks (i.e. the indicator values for a similar project/programme in a comparable context).*

The relevance of indicator values compared to benchmarks in a comparable context is not feasible at this stage due to the limited studies of this type in SIDS such as Vanuatu (see also previous comments in relation to Socio-Economic Benefit studies on investment in meteorological services in developing countries). Indeed, neither indicator values nor relevant benchmarks exist presently in Vanuatu or Pacific SIDS more generally for purposes of assessing impact of CIS-based interventions of the type proposed for this project/programme.

To this end the project will undertake the proposed SEB analysis (Section C.3, Component 3.0/Sub-Component 3.6) as an adjunct to the implementation of the M&E Plan, as described previously. This analysis will generate surrogate or proxy socio-economic indicators based on actual data from the Vanuatu Chamber of Commerce and Bureau of Statistics, as measures of CIS impact under factual/counterfactual scenarios. This analysis will be supplemented with actual ground-truth validation data from the project's M&E activities involving direct engagement with target Next/End-users as part of the sector-specific case studies and community level outreach activities. The SEB analysis is based on the newly developed Cost-Benefit Framework for Pacific CIS from the recently completed GCF Readiness project in Vanuatu... This framework has the potential to be replicated elsewhere in the Pacific SIDS for further staged rollout of CIS-based climate adaptation programme interventions across the region (as part of the Pac-CIS-RDP).

More specifically the economy wide approach proposed to analyse the net-socio-economic benefit of CIS to partner PICs provides scope for comparing key indicators across counterfactuals and to compare the trade-offs between counterfactuals. These indicators can be compared to existing socio-economic indicators as well as desired targets such the sustainable development goals or other environmental targets according to the prevailing circumstances and baselines in each partner PIC. Econometric, economy wide modelling and available government statistics will be used to determine the change in: household welfare, household income, poverty, food and nutritional security, education, gender equality, access to clean water and food, economic growth, investment and infrastructure development, and ecosystem services.

## E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

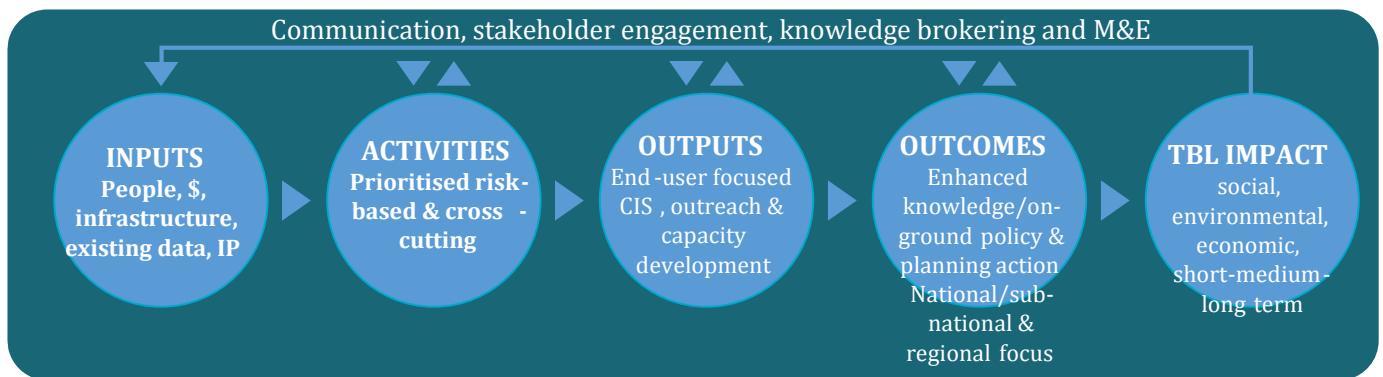
E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)



The programme is consistent with/aligned to objectives of the WMO GFCS designed to facilitate delivery of best practice climate services through relevant NMSs throughout the Pacific SIDS. All such NMSs and associated regional organisations with SPREP taking a lead role through the Pacific Met Desk Partnership are cooperating in the implementation of the GFCS. By association the potential for achieving a paradigm shift in use of science-based evidence to inform decision-making in climate adaptation and disaster risk reduction is high. The establishment of an effective CIS-based Science Technology and Innovation (STI) pathway to facilitate ‘science informing services’ is consistent with the Pacific Climate Services Roadmap and will be underpinned by targeted capacity development at multiple levels of government and local communities to support long-term sustainability of outcomes and impacts.

The use of the case studies as a feature platform for developing and implementing CIS within priority sectors will also facilitate the mainstream application of CIS within Vanuatu and other partner PICs for future projects. This approach will thereby contribute to achieving transformational change and substantive shift towards climate resilience through development and implementation of evidence-based decision-making for climate sensitive adaptation and disaster risk management policies at the national level, and management/response planning by sectors and local communities at the sub-national level.

The design of the national project is both modular and scalable, and explicitly allows for replication, modification and expansion to accommodate other partner country needs as part of the regional programme (Pac-CIS-RDP) as well as further development within partner countries based on feedback and associated learnings from future national projects supported by the proposed regional CIS Community of Practice. This feedback mechanism will be a feature of the proposed EPF and associated M&E Plan and knowledge ‘value chain’ approach to be adopted. More specifically, the programme will allocate resources, employ methods and undertake actions consistent with a logic-based programme level theory-of-action (see also Attachment #2) with key case-study features summarised as follows:



**Figure 8** Communication, stakeholder engagement, knowledge brokering and M&E

In this context, knowledge management is taken to include the full spectrum of creation, capture, storage, transformation and use of data, information and associated products and services (= knowledge) by stakeholders to realise requisite outcomes and associated impacts, noting also:

- Knowledge Management requires integrated in-country capacity development to facilitate long-term sustainability of outcomes and impacts (i.e beyond the term of the programme intervention) and replication beyond the spatial scale of the initial target countries (i.e beyond Cook Islands and Vanuatu to other Pacific SIDS)
- Knowledge Management ‘value chain’ rationale (where ⇨ = value add/transformation) :
  - Data ⇨ Info/products & services ⇨ Knowledge ⇨ Actionable knowledge ⇨ Practice change ⇨ outcomes ⇨ impact
  - In practice, ‘non-linear’ & multi-dimensional – noting multiplicity of stakeholders, needs, timescales, levels of accountability etc

The outcome hierarchy of the logic-based Theory of Action (Attachment 2) identifies initial outcomes and impacts at national and sub-national scale in Vanuatu, with direct linkage through staged programme replication over a ten year time-frame to regional-scale outcomes consistent with the GCF investment and result assessment frameworks. The proposed project for Vanuatu will concurrently undertake modular-designed, multiple case studies to mainstream best available CIS as part of multi-sectoral adaptation and disaster risk reduction decision pathways, thereby providing the benchmark and learnings for staged replication of such an approach in other Pacific SIDS over a period of 8-10 years. The project for Vanuatu will be also be designed in such a way as to facilitate sustainable outcomes at a national level which can then be leveraged by other countries across the region as part of the staged regional roll-out. This leveraging feature will also be facilitated by the programme consortium providing a centralized and consistent support base during this roll-out, with emphasis on the pivotal coordination and support role of SPREP, National met services and key sectoral end-users.

### E.2.2. Potential for knowledge and learning

*Describe how the project/programme contributes to the creation or strengthening of knowledge, collective learning processes, or institutions.*

This project/programme will support applied knowledge and learning and contribute significantly to the creation of a climate and disaster resilient enabling environment (see previous section for details). Through development and delivery of best available CIS targeted directly at adaptation end-user needs and supported by customized and targeted capacity building, the programme will serve to establish a knowledge basis to underpin on-ground adaptation across sectors and regions. Participatory ‘end-to-end’ case studies (as per previously mentioned knowledge value chain) would be implemented in Vanuatu to demonstrate sectoral level adoption of results and application of new adaptation planning solutions.

The project in Vanuatu has a strong focus on co-production of both traditional knowledge (TK) with local community involvement and scientific knowledge through the project team including SPREP, VMGD and Delivery partners. An existing TK database for Vanuatu developed by the COSPPac program is presently managed by the VMGD. This database will be utilized and further enhanced as a key knowledge platform as part of the establishment of demonstration ‘Climate Change Community Resilience Centres’ in selected provinces/islands. These Centres and the TK database will be central to the proposed ‘citizen science’ approach to collection and validation/ground-truthing of new climate data which will inform proposed new

CLEWS and associated longer-term climate awareness and preparedness resources and training for local communities

### E.2.3. Contribution to the creation of an enabling environment

The proposed project in Vanuatu will feature sectoral case studies that focus on existing climate-related decision support pathways and targeted development and application of CIS by sectoral end-users. This approach will enhance these existing pathways and thereby resilient sustainable development outcomes and impacts at national and sub-national scale. A comprehensive range of CIS will address key sectors in Vanuatu including water, infrastructure, tourism, agriculture and fisheries.

Enhanced development and application of CIS will be based on the latest IPCC scientific information, and cover all parameters relevant to undertaking climate Hazard/Exposure/Vulnerability/Risk assessments to ensure climate sensitive decisions are made by sectoral end-users. The cumulative benefits across key sectors are expected to benefit the entire population ultimately through increasing sectoral application of climate proofing mechanisms within adaptation policy development.

The primary purpose of the national project described in this proposal (Van-CIS-RDP) is to develop and strengthen climate resilient development in Vanuatu, with emphasis on supporting climate smart adaptation and disaster risk management policy and planning. It will do this by building institutional and community-based capacity and providing critical resources to facilitate transformational and sustainable change in application of science-based evidence to inform decision-making for relevant policy development and planning processes.

A primary benefit to partner PICs will be through establishment of a 'science, technology and innovation (STI)' pathway. This pathway will feature enhanced scientific data, information and understanding of past, present and future climate to facilitate innovation and continuous improvement of reliable, accurate, effective and efficient CIS.

All partner countries which undertake national projects as part of the regional program will continue to benefit from future innovations and development as part of a regional CIS 'community of practice', whereby strategic and operational learnings will be reciprocated in both directions (i.e. as part of forward planning and by way of review feedback loops between partner countries).

### E.2.4. Contribution to regulatory framework and policies

The programme will undertake an institutional analysis of existing organizational arrangements for policy development, planning and associated decision-making related to climate adaptation and disaster risk management in Vanuatu (and also other partner PICs as part of future national projects). This analysis will factor in existing capacity and associated CIS gaps and needs to facilitate development of a detailed work plan during the Inception Phase. This work plan is outlined by the proposed scope of work under Section C and features multiple sectoral case studies aligned with national/sub-national adaptation strategies, plans and associated priorities. The case studies will involve collaboration with sectoral end-users, NMSs and community groups to develop, demonstrate and evaluate CIS, and ensure immediate uptake of results and learnings at multiple levels, including enhanced knowledge, awareness and policies and plans incorporating mainstream

use of CIS. The combined practical focus on end-user engagement with best available CIS as part of actual, real time sectoral adaptation pathways is expected to strengthen relevant institutional and regulatory frameworks and thereby sustainably improve climate responsive planning and development in Vanuatu.

For Vanuatu specifically, the strategic vision, principals, goals and priorities for climate change and disaster risk reduction policy and planning are provided by the Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030 (SPC 2015). This policy sets the framework for mainstreaming climate change and disaster risk reduction into sustainable development processes for Vanuatu. The policy identifies the joint/integrated governance role of the National Advisory Board (NAB) on Climate Change and Disaster Risk Reduction and the VMGD for purposes of implementing the policy, along with sectoral capability such as the Ministry of Agriculture Risk and Resilience Unit. This policy effectively replace all previous climate adaptation plans and strategies, including the previous (2006) Vanuatu National Adaptation Plan of Action and subsequent draft climate change strategies in 2007 and 2011, with a new National Adaptation Plan now being proposed. The policy identifies key climate change impacts for Vanuatu as including (amongst others):

- reduced availability of freshwater
- shifts in crop[ seasonality of harvest, planting and fruiting
- more pests and diseases of animals, crops and trees
- saltwater inundation and intrusion of coastal land and groundwater
- compromised food security
- coral reef deterioration
- reduced fisheries productivity
- increased risk of human disease and health problems, including vector-borne disease and heat stress
- damage to infrastructure
- loss of coastal land, and
- reduced economic growth and revenue generation

These impacts collectively align directly with the five priority sectors in Vanuatu for this project proposal (see Section C.1 for further details).

- Drive strategic decision-making through contemporary legislation and policy frameworks
- Meet international climate change and disaster risk reduction obligations
- Develop and implement strategic and business plans integrating risk
- Integrate M&E into project and programme design across government agencies and stakeholder groups
- Strengthen existing systems to improve information capture, access and application
- Build on and share existing traditional knowledge and expand its use
- Enhance data analysis and strengthen research activity and capacity
- Strengthen risk assessment processes and address site-specific climate and disaster vulnerabilities

The policy also identifies the need to address cross-cutting issues with emphasis on the importance of capacity building, gender and social inclusion, multi-hazard approaches, mainstreaming and partnerships.

The Vanuatu Meteorology and Geo-Hazards Department Strategic Development Plan 2014-23 (VMGD 2014) sets the strategic context and direction for strengthening the capacity of the VMGD, with emphasis on

developing and supporting “...state of the art technical services...” collectively through enhanced capacity, coordination and partnerships. The strategy focuses on the following priorities (amongst others): Improved weather, climate and climate change services (including across multiple hazards, stakeholders and time frames). Improved observations and associated monitoring networks, and Enhanced capacity for both administrative/project management and research and development, outreach and communications.

### E.3. Sustainable Development Potential

Wider benefits and priorities

#### E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

CIS will help policy makers to formulate policies and courses of action that reduce poverty (through CIS such as rare-event forecasting), increase access to food (through informed use of CIS such as seasonal forecasting), improve health and well-being (through avoided climate and weather impacts), improve access to clean water (through better planning processes), enable transition to a low carbon economy (informing investments in renewable energy such as the best location for solar power stations), improve economic growth (through avoided climate impacts), improve fisheries and catchment management (through climate monitoring of at risk coastal fisheries and ecosystems) and improve life on land (through monitoring local environmental conditions).

Assessment of environmental, social and economic co-benefits, including gender sensitive development impacts will be factored into the programme design, with emphasis on dedicated project-based activities as outlined under Sub-Component 3.6. Moreover, the specific requirements for triple-bottom line SEB studies will be elucidated during the programme inception phase and implemented during the first year of the Vanuatu project's plan. This will ensure that a framework is in place and a benchmark established up front, from which subsequent assessments can be undertaken to inform other relevant project-based activities under the regional programme. This approach is also consistent and integrated with the implementation of the proposed monitoring and evaluation plan to ensure that key findings can inform design and implementation of such programmes in other Pacific SIDS for staged replication of the regional programme over the next several years. Relevant indicators (see also section E1.2) will include an appropriate combination of quantitative, semi-quantitative and qualitative, climate sensitive social, economic and environmental performance metrics.

Some of the metrics considered are listed Annex CBA Framework, and were recurrent themes during the in-country consultation process:

These metrics will also elucidate the latent potential for addressing externalities which are indirectly climate related, including health, safety and other considerations affecting livelihoods and wellbeing of communities in Vanuatu. In this context, climate related hazards are non-discriminatory but the associated risks and vulnerabilities can vary across socio-economic groups in Pacific SIDS. To this end, the project/programme will be non-discriminatory and aim to have cross sectoral impacts such that the entire population will benefit proportionate to socio-economic circumstances and needs. In relation to economic externalities, the project/programme will substantively improve underlying status of various economic drivers in the priority sectors identified by countries (see section C3) by introducing climate sensitive/proofing mechanisms to enhance resilient and sustainable economic development. In relation to environmental benefits specifically, the project/programme will undertake integrated studies in the sensitive coastal zone including those specifically

relating to climate impacts (Hazard/Vulnerability/Risk) on coral reef ecosystems for which Vanuatu coastal communities and other Pacific SIDS are reliant upon.

#### E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

##### E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

Pacific SIDS, including Vanuatu, are subject to significant climate hazards and associated risks and vulnerabilities, both immediate and slow onset events, including from natural climate variability, extremes and longer term change (CSIRO, Bureau of Meteorology and SPREP 2015). These hazards, risks and vulnerabilities are realized across multiple sectors particularly given the high degree of exposure to coastal communities and critical infrastructure.

Vanuatu specifically is subject to impacts from tropical cyclones, extreme temperatures, drought, flooding and sea level changes (see also Section C.2), amongst other climate hazards. These extremes are exacerbated by natural climate variability from large scale processes such as ENSO and SPCZ (see also section C.2), which are also likely to be exacerbated by long-term climate change. Their inshore reef ecosystems in turn are subject to long term increases in sea surface temperatures and acidification, resulting in increased risk of coral bleaching. As an example, according to Kumar and Taylor (2015) a “combination of characteristics such as small land area and widespread low elevations, makes the built infrastructure assets in these countries acutely vulnerable to climate risks. With climate change and projected sea level rise, a larger percentage of the built infrastructure assets will be closer proximity to the coast, increasing their risk to coastal hazards”. Specifically in Vanuatu 48% of built infrastructure respectively is located within 500m of the coastline, with 90% replacement value of built infrastructure (% of country total) (Kumar and Taylor 2015).

The specific CIS gaps and needs of priority sectors and associated Next/End-User in Vanuatu was further elucidated as part of the recently completed GCF Readiness Project stakeholder consultations. Target sectors for Vanuatu as part of the national project (Van-CIS-RDP) identified through stakeholder analysis in Vanuatu June/July 2016 (GCF Readiness Project; see section C.1, C.2 and C.3 for details) are:

- Agriculture
- Fisheries
- Tourism
- Water
- Infrastructure

The baseline conditions relating to access to and use of existing CIS by priority sectors in Vanuatu was established through these various consultations undertaken as part of the GCF Readiness Project (see also Section C.2). The priority sectors and key climate hazards to be addressed by this project are illustrated in **Table 4** above.

##### E.4.2. Financial, economic, social and institutional needs

***Economic and social development***

Weather, climate, and related conditions affect everyone on the planet. The variability of the atmosphere, oceans and land surface, on timescales from minutes to centuries, exerts a major influence on the population and economy. Extreme weather events, prolonged droughts, floods, and other natural weather-related disasters have a financial, environmental, social and economic impact on every country. Developing and emerging economies can be disproportionately affected by the effects of climate and weather. These effects include impacts on human health and well-being, infrastructure (in terms of asset turnover rate, efficiency and direct damage), sector-specific impacts (such as loss of agricultural productivity due to droughts, floods, or changes in growing conditions; energy generation; and tourism through less favorable environmental conditions), and loss of biodiversity and ecosystem services. The delivery of CIS under the proposed project/ programme will allow for policy and decision makers to make more informed choices in terms of production and consumption decisions, infrastructure investments and mitigation and adaptation to climate and weather events. The use of CIS to mitigate the impact of climate change events will result in a more resilient communities, sustained economic growth due to reduced economic disruption, and a reduction in the need for foreign aid for relief from weather and climate related events.

***Absence of alternative sources of financing***

Implementation would be at national scale and therefore facilitate national/sub-national outcomes to ensure greatest potential for on-ground impacts. In this context, activities would be aligned with national priorities according to relevant National Adaptation Plans of Action and Joint National Action Plans (specifically for Vanuatu, the *Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2030*). Specific needs of beneficiaries have also been elucidated by various means through the PCCSP/PACCSAP program as well as other regional programmes and the Vanuatu GCF Readiness Project stakeholder consultations more recently. Partner PICs have identified needs through various means including relevant national communications as part of the UNFCCC process, the regional action plans for the GFCS, the PIMS and the new integrated SRDP under development for post 2016 implementation, and the 2015 loss and damage gap analysis from climate change country report for Vanuatu by SPREP and GIZ. The needs of Vanuatu specifically are further reiterated in the VMGD Strategic Development Plan 2014-2023 and the Vanuatu Framework for Climate Services 2016.

***Need for strengthening institutions and implementation capacity***

The national projects as part of the Pac-CIS-RDP, including the Vanuatu national project (Van-CIS-RDP) will be specifically designed to work in a collaborative manner with key regional and in-country next and end-users including regional organisations, and national government agencies (NMSs) and sectors to ensure that activities are aligned with regional and national priorities, and in-country capacity is developed to facilitate long term sustainability of climate resilient development outcomes. The VMGD is in fact a co-Execution Entity for the Van-CIS-RDP project with SPREP. The design and implementation of the proposed Van-CIS-RDP project case studies will be able to demonstrate, evaluate and implement the use of best available CIS to inform decision-making by end-users and to thereby strengthen institutional frameworks underpinning climate adaptation and disaster risk reduction decision pathways in Vanuatu. More specifically, relevant experts will work directly with end-users to implement leading practice adaptation pathways for individual sectors deemed to be subject to greatest hazards, risks and vulnerability. A key performance management and results assessment metric for the

program will be the extent to which existing institutional frameworks and capacity are strengthened by the project's intervention.

### **E.5. Country Ownership**

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

Linkages to Vanuatu's policy and strategic frameworks have been covered extensively in section C1.

All relevant national (NMSs, sectors) and sub-national/community level stakeholders in Vanuatu will be engaged in the first instance through the GCF NDA/national climate change focal point(s) via SPREP as the accredited Implementing Entity, SPREP and the VMGD as the joint Execution, consistent with the proposed governance arrangement for the Vanuatu national project (see also Section C4 and Attachment 4). This process will ensure that the project design is consistent with and complementary to the prescribed priorities of relevant national plans and strategies, including the Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2023 (SPC 2015).

The programme inception phase will include further detailed next/end-user engagement to review and ground-truth climate adaptation and disaster risk reduction policy and planning priorities for Vanuatu, as well as undertake detailed environmental scanning to identify relevant initiatives and activities already underway, available data sets and opportunities for collaboration and synergies as appropriate. This will ensure that final work plans at Component/Activity level are adequately targeted at priority needs. The project will be supported in this respect through development and implementation of outputs tailored to the specific needs of target Next/End-users including development of a suite of customised communications and capacity development products and services targeted at end-users in appropriate non-technical (and where appropriate local) languages and using multiple medias (e.g. animations, on-line publications, training and resource materials etc) – see also proposed Outputs (Attachment 5a-e) for details.

E.5.2. Capacity of accredited entities and executing entities to deliver

#### **SPREP**

SPREP, is the region's inter-governmental organisation for environment and sustainable development, and is one of several inter-governmental agencies comprising the Council of Regional Organisations in the Pacific (CROP). As outlined in the CROP Statement, SPREP is responsible for the overall coordination and monitoring of climate change activities in the Pacific region and leads the coordinated engagement in the UNFCCC (United Nations Framework Convention on Climate Change). The work of SPREP's Climate Change Division (CCD) is based on the climate change priorities of SPREP Members and consistent with the Pacific Islands Framework for Action on Climate Change 2006-2015 (PIFACC) and other relevant and approved policy drivers such as the Pacific Plan and the Framework for Action on Disaster Risk Management.



SPREP’s CCD for Adaptation Programme executes one of the region’s biggest projects, the Pacific Adaptation to Climate Change Project (PACC Project) in partnership with the United Nations Development Programme (UNDP). SPREP coordinates national ‘on the ground’ implementation activities in 14 Pacific Island Countries and Territories (PICTs) including Vanuatu help them adapt to climate change in three main areas – food security and production, coastal zone management and water resource management. Other activities under the Division’s Adaptation Programme include mainstreaming climate change into national development and budget planning processes; development of National Climate Change Policies; National Adaptation Programmes of Action (NAPA); development of Joint National Action Plans on Climate Change and Disaster Risk Management (JNAP); and knowledge management through the climate change portal in partnership with SPC, GIZ, UNDP and other CROP members. This network and technical expertise will support the achievement of all Project Outputs.

The Division is also involved in capacity development to conduct applied research, fostering meteorology, climatology and oceanic observation and monitoring programmes to improve understanding, awareness, and application of targeted responses to climate change and related disaster risk reduction through the Pacific Islands Global Oceanic Observing System (PI-GOOS) and the Pacific Islands Global Climate Observing System (PI-GCOS) in partnership with partners such as National Institute for Water and Atmospheric Research (NIWA), Bureau of Meteorology (Australia), Commonwealth Scientific and Industrial Research Organisation (CSIRO Australia), World Meteorological Organisation (WMO), National Oceanic and Atmospheric Administration (NOAA), Finnish Meteorological Institute (FMI), Pacific Islands National Meteorological Services, Fiji Meteorological Service/Regional Specialised Meteorological Centre, MetService (New Zealand), Met Office UK and Meteo France.

SPREP is very experienced in the development, facilitation and delivery of short term professional training courses in the areas identified above in many modalities including forums, workshops, short courses (on-line, blended and face to face) workplace shadowing and internships. These deliverables address the drivers, impacts and responses to coastal hazards such as coastal erosion and inundation due to extreme events and long term sea level rise.

**VMGD**

VMGD has wealth of experience in the delivery of projects of similar scope and content. Below is a summary of PMU projects currently managed through the Financial Management & Information System of the Government of Vanuatu through the Ministry of Finance & Economic Management

**Table 5:** Track record of project delivery through VMGD (executing entity)

<b>Project</b>	<b>Brief Description</b>	<b>Funding</b>
1. Increasing Resilience on Climate Change and Natural Hazards (IRCCNH) Project	Institutional strengthening; Technology investment and transfer; Training; Community capacity building. Implemented by DLA, NDMO, VARTC, Rural Water Supply, and Agriculture. (2013 – 2018).	USD \$ 11.1 million Funding Admin- World Bank Global Environment Facility (GEF)/LDLFCF, European Union (EU), Global Facility for Disaster Risk Reduction (GFDRR)

<p>2. Managing Disaster Risk Reduction (MDRR)</p>	<p>Institutional strengthening; Technology investment and transfer; Training; Community capacity build. Implemented by NAB / PMU / VMGD. (2013-2016).</p>	<p>USD \$ 2,728,000</p> <p>Funding Admin- World Bank</p> <p>Government of Japan- Policy and Human Resource Development Trust Fund (PHRD)</p>
<p>3. Pacific Risk Resilience Programme (PRRP)</p>	<p>Strengthening governance mechanisms for Disaster Risk Management (DRM) and Climate Change Adaptation (CCA). Based on Tanna, Tafea Outer islands, Santo and Emae. (2013-2016).</p>	<p>USD \$ 4 to 5 million (approx.)</p> <p>Funding Admin- UNDP</p> <p>UNDP/ GEF / AusAID</p>
<p>4. Coastal Community Adaptation Project (C-CAP)</p>	<p>Community based CCA, planning and implementation of plans based in Efate offshore islands and on Tanna Island. Implemented by DAI / USP. (2013-2018)</p>	<p>USD \$ 3 million (approx.)</p> <p>Funding Admin- DAI &amp; USP</p> <p>US A.I.D. funding.</p>
<p>5. (V-CAP) Adaptation to Climate Change in the Coastal Zone in Vanuatu</p>	<p>Focus on community based climate change adaptation measures at 6 different sites with Infrastructure resilience, upland management and coastal resource management components. Early warning systems and policy support as well. Implemented by PMU, PWD, Environment, Agriculture, and Fisheries &amp; Forestry. (2015-2020).</p>	<p>USD \$ 8 million (approx.)</p> <p>UNDP/ GEF LDCF</p>
<p>6. Natural Solutions to Climate Change in Pacific Islands Region: Implementing Ecosystem-based Adaptation</p>	<p>Education and awareness of ecosystem approaches. Support of ridge to reef and integrated coastal zone management planning. Implemented by Secretariat of the Pacific Regional Environment Programme. Port Vila and surrounding areas plus one site in Tafea Province. (2014 - 2019).</p>	<p>USD \$ 2.9 million</p> <p>International Climate Initiative (German Government)</p>
<p>7. WISE REDD+ Project</p>	<p>Education support for Government Program. Implemented by Conservation International and Live &amp; Learn Vanuatu. (2013-2016).</p>	<p>USD \$ 200,000</p> <p>United States of America Department of State</p>
<p>8. FCPF REDD+ RPP Project</p>	<p>Strengthening sustainable forest management, conservation and agricultural best practices</p>	<p>USD \$ 3.6 million</p> <p>World Bank Forest Carbon Partnership Facility (FCPF)</p>
<p>9. Heading towards increased climate change resilience through freshwater aquaculture development in Vanuatu.</p>	<p>Building coastal ecosystem resilience and food security resilience through integrated aquaculture</p>	<p>Euro \$ 290,630</p> <p>EU</p>

<p>10. Solar and Bio-Solar electrification of Vanuatu with the implementation of a sector-specific Climate Early Warning System “Dash Board”.</p>	<p>Increased sustainability of livelihoods in Vanuatu through the enhanced energy security and Climate Early Warning System that strengthens, supports and enables both the Energy and Livestock sectors to adapt to the adverse effects of climate change.</p>	<p>Euro \$ 710,000 EU</p>
<p>11. Third National Communications</p>	<p>Reporting obligation for Vanuatu as party to the UNFCCC that will look at national circumstances, GHG inventory, vulnerability, progress in adaptation and mitigation efforts including institutional arrangements to facilitate national implementation of the UNFCCC.</p>	<p>USD \$ 500'000 UNDP/GEF</p>
<p>12. INDC</p>	<p>Development of Vanuatu’s INDC for submission to the UNFCCC</p>	<p>USD \$ 100'000 UNDP</p>

**Pipeline Projects**

- Climate Change & Health (UNDP) – USD\$ 4'000'000
- GEF6 Country allocation for climate change – USD\$ 2'000'000
- UNEP GCF Adaptation Project – USD\$ 20'000'000

**E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders**

The stakeholder engagement and consultative process for this proposal is based around a number of complementary activities, including ongoing engagement with the Vanuatu NDA (see below) and broader longer term strategic processes including the delivery, evaluation and close-out of the PACCSAP program, the delivery of related programs in the Pacific (FINPAC, COSPPac, RoK--PI CliPS), roll-out of the GFCS by the WMO and activities of the Pacific Meteorological Desk Partnership (SPREP), Pacific Meteorological Council and associated PICS Panel. More specifically, as part of the evaluation of the PACCSAP science program, extensive in-country stakeholder engagement was undertaken at regional and national level in fourteen partner Pacific Island countries including Vanuatu, to identify remaining information gaps and emerging needs at national level. At the Honiara 2013 PACCSAP Science Symposium, a panel of NMS directors and delegates provided direct insight into the national priorities around CIS for meeting stakeholder needs. At an out-of-session meeting of the PMC, as a side event to the Cook Islands regional GFCS workshop in 2014, these priorities were re-affirmed by NMS directors. More recently, in an inter-regional strategic planning meeting in Melbourne, Australia in 2015, involving SPREP, the Indian ocean Commission, the WMO, CSIRO and the Bureau, a consensus decision was made to progress complementary regional CIS-based strategies in the Indian Ocean and the Pacific SIDS, with pacific emphasis on providing increased support for turning new climate science knowledge into applied, on-ground adaptation outcomes at a sectoral level in partner PICS. The PACCSAP program has recently published jointly between CSIRO, Bureau and SPREP the 2015 report entitled “Climate in the Pacific” in which

the key climate impacts have been described for all countries including Vanuatu, based on the latest climate science knowledge.

Concurrently, the WMO has been rolling out the implementation of the GFCS in the Pacific and other SIDS regions, including identifying the development of CIS and associated capacity in met services and sectors as a priority action. Likewise the PMC through the PICS panel has identified priority actions relating to development of CIS and associated capacity to facilitate implementation of the Pacific Islands Meteorological Strategy 2012-2021. There have also been several national-led strategies undertaken in Vanuatu identifying priority gaps and needs in relation to CIS in support of adaptation planning, including the Loss and Damage Gap Analysis from Climate Change Vanuatu Country Report by SPREP and GIZ (2015) and more recently the Vanuatu Framework for Climate Services (SPREP 2016) and the WMO sponsored 2016 Vanuatu Climate Outlook Forum convened in port Vila by the VMGD. All such activities and associated documentation have variously informed the preliminary design of the national project for Vanuatu (Van-CIS-RDP).

More recently, the project planning team (VMGD, SPREP, and CSIRO) actively supported by the Vanuatu GCF NDA (Mr Jesse Benjamin) have completed further in-country consultations with key stakeholders at national and provincial government level, including sectoral specialists, to ascertain specific CIS gaps and needs to inform the scope/scale of this proposal. This was supported via the NDA endorsed and GCF approved Readiness Project. Workshops were held at the VMGD in Port Vila during the period June-July 2016, as well as field trips to engage with provincial government and local community stakeholders in Espiritu Santo and Efate. The key activities and outcomes for these consultations have been summarized previously (see Section C.1, C.2 and C.3), and will be detailed in the Readiness Consultation Report.

## **E.6. Efficiency and Effectiveness**

Economic and, if appropriate, financial soundness of the project/programme

### **E.6.1. Cost-effectiveness and efficiency**

The grant request, in-kind contribution and existing IP and programmes allow for the effective and efficient delivery of the proposed set of activities to achieve the stated outcomes. As discussed previously there are no other appropriate funding sources for the delivery of the CIS public good, which is needed to support Vanuatu's long term climate resilient development. The investment, as set-out, will directly address capacity, technological and coordination barriers and bottlenecks, which are currently inhibiting the uptake and application of CIS to its full effect.

This program would leverage off considerable achievements and learnings from previous and existing/ongoing programmes in the Pacific, Australia and New Zealand, including the PCCSP/PACCSAP, COSPPac, FINPAC, ROK-PI CLIPS, ACCSP, Australian NRM projections products and services etc. In relation to the PCCSP/PACCSAP science program specifically, this was deliberately designed and implemented as a regional program, with the primary objective of increasing scientific understanding of climate variability, extremes and change in the western tropical Pacific. Key stakeholders, although not exclusively so, were the partner PIC NMSs and regional organisations (including SPREP, SPC and USP). This was in the context that prior to PCCSP/PACCSAP there was limited such knowledge and that most stakeholders were coming from a very low baseline. Whereas

PCCSP/PACCSAP was substantially successful at generating a considerable and credible cohort of new science based climate knowledge complete with a range of purpose built communication products and research/management tools for the Pacific, including nationally relevant climate projections data consistent with IPCC processes, there was limited scope for end-user engagement for development of sector specific science information for policy and planning. In particular, limited support was available for partner PIC NMSs to engage with sectoral stakeholders to communicate this knowledge and to translate it into applied, on-ground actionable knowledge by end-users. This GCF program will provide country, site and sector specific science and complement the regional work of PACCSAP.

This proposal will achieve effectiveness and efficiency through alignment of programme design and detailed work planning and delivery with design and implementation of the existing WMO GFCS via the Pacific Roadmap for Climate Services and other relevant regional and national climate initiatives including the Vanuatu Framework for Climate Services (SPREP 2016). A dedicated capacity development component would feature customised packages for specific stakeholder groups, including accredited technical training for NMSs (prioritised according to existing COSPPac capacity mapping data for NMSs) and regional organisations. Capacity development would be supported by relevant on-line tools, portals and training resources supported initially by science and technical experts from the regions and Australia but with transitional arrangements ultimately to PICs. Such emphasis on in-country capacity and infrastructure development will provide the necessary framework for sustaining longer-term outcomes beyond the term of the proposed programme, with emphasis on the critical long-term coordination and support role of key Pacific regional organisations.

The efficiency and effectiveness of the project intervention will be determined as part of the proposed SEB analysis (Section C.3, Component 3.0/Sub-Component 3.6), as previously described. There are no established socio-economic benchmarks for CIS intervention in the context of SIDS and associated developing countries. To this end, this project will provide ground-breaking data, information and knowledge. The outputs of the SEB analysis will be fed back into the project design and annual work plans at the Component/Sub-Component level through the ongoing implementation of the M&E Plan to optimise CIS impacts. This information will also inform and subsequent staged roll-out of the programme for replication elsewhere in the region.

In practice, efficiencies and effectiveness will be optimised in this program using the experience, achievements and learnings of the previous PCCSP/PACCSAP programs and other relevant regional/national programmes including COSPPac, FINPAC, ROK-PI CLIPS, the ACCSP (latter delivered by CSIRO and the Australian Bureau of Meteorology over > 25 yrs) and the Australian NRM climate projection products and services, plus the collective experience, achievements and learnings of various major programs delivered by SPREP, the WMO and partner regional organisations and PICs across the Pacific. The program will be supported by a comprehensive governance framework facilitated by the M&E plan to ensure implementation is targeted at end-user needs, meets all requisite Quality Assurance and Quality Control (QAQC) standards and realises measurable and tangible outcomes for beneficiaries. The commitment to incorporate best practice governance and associated QAQC standards, including the use of M&E planning is a key to programme management (e.g. planning, performance management, risk management and impact assessment tool).

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

### E.6.3. Financial viability

*Please specify the expected economic and financial rate of return with and without the Fund's support, based on the analysis conducted in [F.1](#).*

Estimates of NPV and EIRR are provided as indicative measures according to Newth et al (2016). The NPV, which is the difference between the discounted total benefits and cost, was calculated to be US\$132.5 million, with a discount rate of 5%. This represents a benefit-cost ratio of 5.3 to 1. The Internal Rate of Return (IRR), which is the discount rate that zeroes out the NPV, or the interest rate that makes the NPV of all cash flows equal to 0, was calculated to be 68%. Since it is impossible to accurately predict future per capita consumption growth within Pacific national economies, a sensitivity analysis was conducted to illustrate the benefits of the Project at lower and higher rates of return. At a discount rate of 10%, NPV is equal to US\$88.9 million, and with a discount rate of 15%, NPV equals US\$53.2 million. This demonstrates that the Project would be economically viable even with much higher discount rates.

Note: Activities to be undertaken as part of Sub-Component 3.6 will include SEB studies to provide preliminary Triple Bottom Line (economic, environmental & social) benefit-cost ratios for delivery of enhanced, science-based climate information, products, services and associated knowledge and capacity, consistent with recommended methodology of WMO (2015). This will seek to validate ongoing investments and enhance concurrent and future program delivery in Vanuatu and the broader Pacific Islands region (see also details provided in section F.1)

*Please describe financial viability in the long run beyond the Fund intervention.*

VMGD is the largest department within the Vanuatu Ministry of Climate Change. Under the current structure, it will increase its staff to 89 (if you include PMU Staff, it will be close to 100). The department has seven divisions, one of which is the ICT/Engineering Division. VMGD has an annual budget that fluctuates from 1.2 to 1.5 million US dollars annually. It is anticipated that the budget will increase by 15% in 2017 to accommodate existing personnel, infrastructure and service delivery needs.

Please also refer to Section D2 Exit Strategy.

*Please describe the GCF's financial exit strategy in case of private sector operations (e.g. IPOs, trade sales, etc.).*  
Not applicable

### E.6.4. Application of best practices

*Please explain how best available technologies and practices are considered and applied. If applicable, specify the innovations/modifications/adjustments that are made based on industry best practices.*

This programme will leverage off the practices and learnings off relevant programs in the Pacific, including PCCSP/PACCSAP, FINPAC, COSPPac, WMO Canada Project and Australia, including the ACCSP and more recently the NRM and Earth Systems and Climate Change Hub of the National Environmental Science Programme.

These programmes have been delivered in partnership between CSIRO and the Bureau, and in the Pacific with SPREP and other regional organisations. The outputs of these programmes are internationally recognized as leading practice to the standard of the IPCC, noting also that a number of lead and associate IPCC authors from

CSIRO, Bureau and SPREP are involved in delivery of this programme. The end-user engagement elements of the programme will be aligned with leading practice adaptation pathway methodologies as determined by key stakeholders in the region and Australia, including SPREP, other Pacific regional organisations, the WMO and the Australian Department of the Environment (previously lead agency for delivery of the Adaptation planning component of PACCSAP and currently a partner of CSIRO and the Bureau in delivery of the ACCSP, NRM and the *Climate Change in Australia* website). SPREP, with collaborative support from other regional organisations and the Australian Department of the Environment as appropriate, will draw on existing experience and leading adaptation practices to ensure that the CIS generated by this programme will meet the needs of Pacific decision-makers and be used to deliver priority adaptation outcomes and impacts in a manner consistent with international benchmarks.

A primary benefit to partner PICs will be through establishment of a 'science, technology and innovation (STI)' pathway. This pathway will feature enhanced scientific data, information and understanding of past, present and future climate to facilitate innovation and continuous improvement of reliable, accurate, effective and efficient CIS.

All partner countries which undertake national projects as part of the regional program will continue to benefit from future innovations and development as part of a regional CIS 'community of practice', whereby strategic and operational learnings will be reciprocated in both directions (i.e. as part of forward planning and by way of review feedback loops between partner countries).

E.6.5. Key efficiency and effectiveness indicators

N A

*\* The information can be drawn from the project/programme appraisal document.*

## F.1. Economic and Financial Analysis

*Please provide the narrative and rationale for the detailed economic and financial analysis (including the financial model, taking into consideration the information provided in [section E.6.3](#)).*

As previously described, the World Bank Group, with a current hydro-meteorological investment portfolio of around US\$500m, estimates that globally improved weather, climate and water observation and forecasting could lead to up to US\$30b/annum in increases in global productivity and up to US\$2b/annum in reduced asset losses (WMO, 2015).

More specifically, Hallegatte (2012) estimates economic benefit: cost ratio of improving meteorological/hydrological services at national level in weather and climate sensitive sectors ranging between 4:1-36:1 within developing countries. According to WMO (2015), full benefit: cost estimates for investment in science and technology-based enhanced climate services need to incorporate triple bottom line (economic, social and environmental) analysis. As an example, Holland (2014) Economic Dimensions of Improved Meteorological Services in the Pacific estimates that a 1% reduction in damage from (improved information and) improved severe weather warnings to the community and business would generate regional cash savings of US\$3.6m; an estimated 6:1 benefit : cost ratio.

Reliable, more extensive analyses have not been undertaken to date in the western tropical Pacific, or indeed in SIDS more generally. Nonetheless, WMO (2015) asserts that the implementation of the GFCS, which explicitly promotes better access to and use of climate information by users and the free and open exchange of climate relevant data as an international public good, facilitates the “delivery of goods and benefits in key economic sectors such as agriculture and food security, health, energy, disaster risk management, water resource management and urban environments”.

According to ADB (2009), development of decision making processes for prioritization and resource allocation at the national level to address climate impacts (e.g. through development and implementation of CIS) has been identified as a priority need in Pacific Island economies. Areas of action needing support to address these gaps include: the use of economic analysis in climate change decision making and the incorporation of climate change considerations into economic analyses, including addressing intertemporal and intergenerational costs and benefits; and improve the climate and economic information bases for economic analyses related to climate change and strengthen the relevant policy analysis.

With this in mind, a Cost-Benefit Framework has been developed as part of the Readiness project for Vanuatu. The proposed CBF to be implemented as part of the proposed Monitoring and Evaluation Plan for the project, introduces non-econometric analyses and measures (both direct and proxy) for evaluation of socio-economic benefits in a more holistic and indeed informative, robust and transparent manner (Newth et al 2016), than the general ex-ante approaches applied.

Nevertheless and in the interim, for the purposes of this proposal estimates of NPV and EIRR are provided as indicative measures according to Newth et al (2016). Key assumptions are that the project is based on a four year implementation phase for a US\$25million investment commencing in 2017, there is a 10-year useful life of the CIS outputs, and benefits in terms of reduced disaster damages and increased socio-economic benefits are assumed to increase linearly starting from year 2018. Since Pacific Island economy GDP growth rate has



been on average 3.4% in the recent past (see <http://data.worldbank.org/region/pacific-island-small-states>), a discount rate of 5% can be used to calculate the Net Present Value (NPV) in this project. This is justified by the fact that although there is potential for future growth in these economies, there are also high risks caused by potential climatic, natural disaster and governance risks. A 5% discount rate represents an understanding that future costs and benefits are relatively important in comparison to the current situation – concurrent with concerns regarding climate change. The NPV, which is the difference between the discounted total benefits and cost, was calculated to be US\$132.5 million, with a discount rate of 5%. This represents a benefit-cost ratio of 5.3 to 1. The Internal Rate of Return (IRR), which is the discount rate that zeroes out the NPV, or the interest rate that makes the NPV of all cash flows equal to 0, was calculated to be 68%.

Since it is impossible to accurately predict future per capita consumption growth within Pacific national economies, a sensitivity analysis was conducted to illustrate the benefits of the Project at lower and higher rates of return. At a discount rate of 10%, NPV is equal to US\$88.9 million, and with a discount rate of 15%, NPV equals US\$53.2 million. This demonstrates that the Project would be economically viable even with much higher discount rates.

## F.2. Technical Evaluation

*Please provide an assessment from the technical perspective. If a particular technological solution has been chosen, describe why it is the most appropriate for this project/programme.*

There has been no specific technical evaluation undertaken for this programme. The technical design of this program is collectively informed by outcomes of the PCCSP/PACCSAP Program and extensive consultation between SPREP and executing partners with relevant stakeholders in Vanuatu over the last several years via various regional and national forums including the Pacific Climate Change Roundtable and the activities of the Pacific Met Desk Partnership and projects such as Pacific Adaptation To Climate Change (PACC)(SPREP and UNDP 2014) and the Pacific Islands Framework for Action on Climate Change (PIFACC 2015). More specifically, as part of the evaluation of the PACCSAP science program, extensive in-country stakeholder engagement was undertaken at regional and national level in fourteen partner Pacific Island countries including Vanuatu, to identify remaining information gaps and emerging needs at national level. At the Honiara 2013 PACCSAP Science Symposium, a panel of NMS directors and delegates provided direct insight into the national priorities around CIS for meeting stakeholder needs. At an out-of-session meeting of the PMC, as a side event to the Cook Islands regional GFCS workshop in 2014, these priorities were re-affirmed by NMS directors. More recently, in an inter-regional strategic planning meeting in Melbourne, Australia in 2015, involving SPREP, the Indian ocean Commission, the WMO, CSIRO and the Bureau, a consensus decision was made to progress complementary regional CIS-based strategies in the Indian Ocean and the Pacific SIDS, with Pacific emphasis on providing increased support for turning new climate science knowledge into applied, on-ground adaptation outcomes at a sectoral level in partner PICS. The PACCSAP program has recently published jointly between CSIRO, Bureau and SPREP the 2015 report entitled “Climate in the Pacific” in which the key climate impacts have been described for all countries including Vanuatu, based on the latest climate science knowledge for the region.

Other relevant programmes include the Pacific Adaptation to Climate Change (PACC) Program (and other SPREP delivered activities), various climate adaptation programme and project activities implemented by SPC,

implementation activities of the PIMS under direction of the PMC and the PICS panel, Island Climate Updates and Online Climate Outlook Forums, PIC National Adaptation Programmes of Action implementation activities, ROK-PI CLIPS /APEC CC, WMO GFCS, COSPPac, FINPAC and PACE-SD. Learnings from relevant Australian programmes in Australia will also be leveraged including the Australian Climate Change Science Programme (ACCSP), Australian Natural Resource Management (NRM) climate projections and services and the new Earth Systems and Climate Change Hub of the Australian National Environmental Science Programme (NESP).

Concurrently, the WMO has been rolling out the implementation of the GFCS in the Pacific (Pacific Roadmap for Climate Services) and other SIDS regions, including consultation with key stakeholders on gaps and needs, and identifying the development of CIS and associated capacity in met services and sectors as a priority action.

Likewise the PMC through the PICS panel has identified priority actions relating to development of CIS and associated capacity to facilitate implementation of the Pacific Islands Met Strategy. There have also been several national-led strategies undertaken in Vanuatu identifying priority gaps and needs in relation to CIS in support of adaptation planning, including the Vanuatu Climate Change and Disaster Risk Reduction Policy 2016-2023 (SPC 2015), the VMGD Strategic Development Plan (2014-2023) ), and the Vanuatu Framework for Climate Services (SPREP 2016) (see also Section C.2 for relevant details). A full bibliography of relevant literature from which this programme has drawn strategic intelligence to inform the direction, methodologies and operational approach is provided at the end of this document.

The GCF Readiness Project for Vanuatu undertaken during 2016 has informed this proposal in more details, specifically in three key areas:

- Key stakeholder consultation – undertaken in Vanuatu during the period June-July 2016 at national/sub-national/provincial government across priority sectors and at local community level. The key findings are summarized in Section C.2 and Attachment 6
- Synthesis of activities and learnings from previous/existing climate projects and programmes in Vanuatu and the Pacific more generally, with emphasis on PCCSP/PACCSAP, COSPPac, FinPac, Rok-PI-CLIPs and other related national initiatives in Vanuatu (see details Section C.2)
- Development of a conceptual Cost-Benefit Framework (CBF) for undertaking SEB analysis in Vanuatu and the Pacific more generally

### F.3. Environmental, Social Assessment, including Gender Considerations

*Describe the main outcome of the environment and social impact assessment. Specify the Environmental and Social Management Plan, and how the project/programme will avoid or mitigate negative impacts at each stage (e.g. preparation, implementation and operation), in accordance with the Fund's Environmental and Social Safeguard (ESS) standard. Also describe how the gender aspect is considered in accordance with the Fund's Gender Policy and Action Plan.*

A screening of the project activities as per the SPREP Environmental and Social Management System (ESMP) requirements and procedures has been undertaken. Documentation of this is provided as at Annex 4. In summary the screening processes resulted in the project being categorized as a very-low, Category C, Environmental and Social (ES) risk project. This is primary due to the nature of activities which are orientated towards training, knowledge generation, and coordination. There a small number of equipment installation (automatic weather stations) and very small scale construction activities (associated with the community

climate change centers) which will need to be monitored for potential (low, if any) ES risks. In any case the ongoing project design, work plan and implementation will be attuned to the potential (even if very minor) ES risks that might arise.

To ensure these processes are attuned in this way the project will monitor ES risk as part of the overall risk management approach to be adopted by the project, which will identify, avoid/mitigate all risk at the activity level. This means the project will adopt an ES risk mainstreaming approach where all key activity planning, implementation and monitoring processes are sensitive to ES risk. This will be achieved through integration of ES factors into activity work plans, contractual and procurement processes, and activity reporting. At this proposal stage the relevant environmental and social risk has been reflected in the Risk Management Plan (of this proposal).. The identification of possible (low) ES risk in the RMP will serve as an entry point for the ongoing elaboration of ES consideration through the project, beginning with the inception phase of the project where (as indicated above) ES will mainstreamed into specific activity design and deliver. To oversee this both national, and regional level steering committees will consider ES in their deliberations on project implementation, under guidance from SPREP as the accredited entity. Through this broad strategy ES risk will be considered continuously through the project and in addition general awareness of ES risk can also be raised within Vanuatu, SPREP and project stakeholders.

At the ES screening stage which was undertaken for this project the following very minor ES risks were identified, though were assessed as not triggering the need for further, dedicated environmental or social impact assessment. As mentioned above the risks identified below and the broad ongoing strategy for monitoring and managing potential ES risk is captured at this point in the RMP of this proposal. .

- **RISK 1:** ES Risk Category: Safeguard 1: Assessment and Management of Environmental and Social Risk:

Nature of risk: There is a risk that the project, in its development and application of CIS to development (policy, planning, and project) processes becomes associated with higher risk projects and processes. For example, the project may provide CIS for a road development, which comes higher levels of risk. While this is acknowledged the risk implications for this project is considered low, as these factors are outside of the influence of this project and the CIS outputs from this project will only serve to strengthen the design and delivery of any down-stream projects, such as the road construction example.. Further, it is expected that Vanuatu's environmental impact assessment legislation will be applied to relevant development projects, including any aspect of the proposed project, should this be required (the activities, as currently defined do not trigger the need for EIA as per the legislation). If this project, through delivery of CIS for development initiatives does become associated with higher risk projects, as a minimum this project will ensure that the associated project has the appropriate and adequate ES risk management processes in place. Where the understood or perceived level of ES risk of the associated project is too high, without adequate ES management measures in place, this project will consider disassociating itself with the associated project.

The mechanisms in place to ensure this, as mentioned above, include the consideration of ES risks at all stages of activity design, implementation and monitoring. In this particular instance, the national and regional level steering committees (and SPREP as the AE) will consider the E&S risk associated with the Case Study initiatives of the proposal.

- **RISK 2:** ES Risk Category: Labor and Working Conditions

2.1 Nature of Risk: There is a low risk that the project, through the recruitment of project staff, engagement with community and other stakeholders, applies discriminatory practices, for example on the basis of gender. The Vanuatu Constitution recognizes the rights and freedoms of all individuals without discrimination on the grounds of sex, race, place of origin, religious and traditional belief, opinions or language. Nevertheless forms of discrimination and issues of equality (whether direct or indirect) exist in Vanuatu particularly with regard to gender. One aspect of this is reflected by the fact that women represent 40% of the public and private workforce (2011 VNSO).

Vanuatu and SPREP recruit on the basis of merit and apply non-discriminatory principles and approaches. Further, and as discussed in more detail below (and detailed in the Gender Analysis and Action Plan) the project will pro-actively help progress the National Gender and Equality Policy by encouraging and providing targeted opportunities to support the participation of women in all aspects of the project, including representation on the committees, representation and engagement in ongoing consultation processes and employment in the project staffing positions. The project will also aim to ensure (and monitor) that project outcomes will benefit men and women, equally (or to ensure equality of benefits).

2.2 Nature of Risk: There is a low risk that the project will require project staff, contractors and other stakeholders to work in potentially hazardous environments. For example field work associated with Component 3 and 4 of the project may require field work in hot, sunny and somewhat rugged terrain (beaches, hillsides etc.). The usual occupational health and safety precautions will be applied including in accordance with the SPREP Occupational Health and Safety Policy and Guidelines and the Vanuatu O&HS Policy.

- **RISK 3:** ES Risk Category: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Nature of risk: there is a very low risk that installation of some of the infrastructure associated with the project will disturb to a very limited extent, the natural environment. It is proposed that the project team (under the oversight of the project governance arrangements) identify and mitigate or avoid the potential very low risk associated with the activities as required. As mentioned awareness of ES risk will be raised throughout the project, including with the project team so that should any

unexpected risk emerge during the planning or implementation of the project this can be identified and managed appropriately, under the guidance of SPREP as the Accredited Entity.

**Gender:**

The Government of Vanuatu (via the VMGD) and SPREP, as the two executing (and accredited) entities are committed to promoting gender equality and women's empowerment. Issues of gender equality, discrimination based on gender and other social, cultural and economic factors impacting on gender inequality and opportunity persist in Vanuatu. These issues are detailed in the annexed (Annex XX) Gender Assessment (and Action Plan).

Vanuatu has adopted and is progressing implementation of the Vanuatu National Gender Equality Policy (2015-2019). This along with the SPREP Gender Policy (2016) provide principled and practical guidance on how gender equality and women's empowerment can be mainstreamed in the ongoing design and delivery projects. Both policies also set out specific strategic goals and indicators of progress. The project will adopt these principles and practical actions (and report against the goals and indicators as appropriate) along with the GCF Gender Policy. More specifically, the project will progress, monitor and report on three gender (project) specific objectives, as detailed in the annexed Gender Analysis and Action Plan.

The project will aim to:

- 1. Increase understanding (across the 5 target sectors) of how climate change can impact both men and women differently.**
- 2. Address the climate vulnerabilities of both men and women through the delivery of tailored Climate Information Services which address the specific vulnerabilities of both men and women across the 5 Sectors.**
- 3. Promote women's empowerment and contribute to efforts which overcome prevailing stereotypes which entrench gender based inequalities.**

Details of how the project will deliver against these objectives, and indicators of progress are included in the Gender Analysis and Action Plan. In summary the project will adopt the following strategies to help ensure contribution to the key Strategic Area objectives and measures as follow:

- All project staff (including executing entities, PMUs and committees) will be aware of relevant policies (the VGP and SPREP GP) and be required (by ToR) to apply its principles and support progress of its objectives. Where possible, the project staff will be supported to undertake necessary training to raise awareness of the role they can play in progressing gender equality goals.
- Work plans, service and partner agreements will recognize and require gender sensitive and mainstreaming approaches, in line with VGP, SPREP GP and GCF GP.
- All consultation and training processes to be undertaken as part of the project will adopt gender sensitive approaches, including targeted gender based consultation and training activities where appropriate. .
- Further the project will actively pursue engagement with key organizations progressing gender equality. The Department of Women's Affairs will be invited to sit on the National Level Steering

Committee, and the project will work with and through women's and other community groups as appropriate.

- All CIS communication products, tools and resources (and other activities) will be designed and delivered with the intended next/end user gender based (and other) needs taken into account. This will include addressing gender based vulnerabilities to climate change, for example in the agriculture sector where women are considered particularly vulnerable to the impacts of climate change. The project will develop women's capacity and support women's resilience (inter alia) including through equal participation in the citizen science activity of the project; promote gender considerations in policy development; and in line with the VGP, ensure at least 30% female representation with a target of 50% for any community based positions and responsibilities associated with the CIS champions and Climate Centers.
- Collect and evaluating progress against the 3 gender based objectives of the project, and incorporate collection of sex-disaggregated data against each of the relevant indicators as outlined in the Logic (results) Framework section of this proposal (also see note below).

**Note:** Further, the specific requirements for the triple-bottom line Social Economic Benefit studies (Component 4) will also be elucidated during the Inception Phase and implemented during the first year of the project work plan. This will ensure that a framework is in place and a benchmark established up front from which subsequent assessments can be undertaken to inform relevant project-based activities, including for future CIS projects in the Pacific.

#### F.4. Financial Management and Procurement

Further to detail provided in Sections C4 and C7 of this proposal, project financial, accounting and procurement accountability will be the overall and ultimate responsibility of SPREP as the Accredited entity.

The SPREP Financial Procedures Manual<sup>11</sup> sets out the financial procedures to be followed and adopted as required under Financial Regulation 25 on Internal Control where the Director General is required to establish detailed financial rules and procedures in order to ensure effective financial administration and the exercise of economy. These rules and procedures are set out in the SPREP Financial Procedures Manual and associated policy documents, manuals, charters and guidance notes. SPREP utilizes 'Tech One' Financial Management and Information Systems. VMGD has recently adopted a new Financial Management Manual (developed in accordance to World Bank standards) with an integrated 'Smart Stream' Accounting system. Through the establishment of the Executing Partner Agreement the functional relationship between the two systems will be established to give effect to the broad procedures set out below via an Project Operations Manual (as an attachment to the EPA).

##### Financial Disbursement

SPREP will disburse funds (from the GCF Grant Account) on a regular (6 monthly) basis to an account held in Reserve Bank of Vanuatu the Government of Vanuatu Department of Finance Designated Project Account to allow for delivery of project activities as per the agreed work plan and budget, and based on reporting to

<sup>11</sup> The Financial Procedures Manual is currently under review

SPREP on financial expenditure and reconciliation (as per the Executing Partner Agreement(s) to be established). Fund will be released for activity delivery, from the RBV Designated Project Account (for VMGD PMU activities) and the SPREP Grant Account (for SPREP PMU activities) following respective procedures of the VVMGD FMM and the SPREP FPM.

### **Procurement**

SPREP maintains a Procurement Policy and Manual (2016 edition) which sets out principles, processes, and rules for undertaking procurement. The manual also provides guidance on working with executing partners, such as with VMGD for this project, noting that *in the Executing Partner Agreement (EPA) signed between SPREP and the executing partner or sub-delegate, all relevant rules and procedures, including the procurement policies and procedures should be clearly described. The basic rule is that the executing partner or sub-delegatee should follow the appropriate policies, rules and procedures (equivalent to the procedures used by SPREP) in all material aspects for providing financing from the donor funds through procurement. Throughout the project implementation period, SPREP will perform oversight functions on the activities undertaken by the executing partner and monitor its performance against compliance with relevant policies, rules, and procedures in all procurement activities. The EPA will also indicate consequence of non-compliance and remedies thereof*

Hence the specific requirements for procurement will be finalized during the establishment of the EPA noting that the VMGD PMU has adopted the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits (VMGD Procurement Guidelines).

### **Financial accounting**

Financial accounting will be undertaken in accordance with the SPREP FMP and the VMGD FMM, using the SPREP 'TechOne' and VMGD 'smart stream' systems unless, for the purposes of consistency and comparability otherwise stated in the EPA to be established between SPREP and the VMGD.

### **Auditing**

Both VMGD and SPREP as the executing entities will prepare Financial Statements, for each calendar year, to be audited by a qualified external auditor. Such processes are standard for both entities - SPREP's annual financial statements follow International Financial Reporting Standards (IFRS) and are verified by an independent auditor in accordance with the International Auditing Standards (IAS). The project will be subject to the SPREP annual audit of financial statements. VMGD is also subject to annual financial audit undertaken by either the Auditor General's Office or by an Auditing firm contracted by the Auditor General and in accordance with IPSAS. The project will include a review of the GCF account and statement of project expenditures, together with an audit opinion and management letter.

### G.1. Risk Assessment Summary

*Please provide a summary of main risk factors. Detailed description of risk factors and mitigation measures can be elaborated in G.2.*

Main risk factors assessed as relevant to relate primarily to:

- In-country support for the programme, including allocation of time for key personnel within sectors to participate in case studies
- Access to national data collections and associated baseline conditions for purposes of undertaking requisite analyses
- Alignment of case study project activities to relevant national/sub-national strategies and priorities
- Transferability of programme findings for replication of learnings elsewhere in the Pacific
- Availability of resources and standards of to ensure effective and efficient programme delivery
- Sustainability of programme findings to facilitate long-term outcomes and impacts in Vanuatu
- Management of possible environmental and social risk factors that may arise during implementation of the project.

All such factors have been identified and assessed on basis of likelihood/consequence, and overall risk ratings determined to inform requisite response to mitigate risks as part of overall programme design, governance and associated management & administration framework to be implemented by SPREP CCD, VMGD and CSIRO (i.e. to include integrated communication and knowledge management planning, key stakeholder relationship management and monitoring and evaluation throughout the programme).

### G.2. Risk Factors and Mitigation Measures

*Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.*

#### Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
Support for/participation in project/programme activities by key stakeholders in Vanuatu/other partner PICs	Technical and operational Technical and operational	Medium (5.1-20% of project value)	Medium

#### Mitigation Measure(s)

*Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?*

Key risk mitigation response measures:

- Ensure the project/programme design is relevant to/aligned with existing national and sectoral priorities



- Ensure proposed project/programme activities are relevant to/aligned with existing sectoral activities and are complemented by an effective communications, knowledge brokering and stakeholder engagement plan for target Next/End-Users
- Develop work plans in collaboration with in-country partners and ensure proposed project/programme activities are appropriately resourced and scheduled to minimize disruption to existing services
- Ensure project/programme activity outputs are customized/tailored for target Next/End-Users and in-country capacity is developed to facilitate active and ongoing engagement in a sustainable manner
- Ensure project/programme design and implementation based on effective Monitoring & Evaluation Planning framework

Proposed mitigation response will lower the probability of risk occurring to Low

**Selected Risk Factor 2**

Description	Risk category	Level of impact	Probability of risk occurring
Access to relevant technical/scientific expertise, national data sets and relevant baseline/existing CIS and related information for Vanuatu/other partner PICs	Technical and operational	Medium (5.1-20% of project value)	Medium

Mitigation Measure(s)

*Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?*

Key risk mitigation response measures:

- Ensure that requisite expert, multi-disciplinary scientific/technical expertise is accessed through consortium of Delivery Partners
- Utilise existing open-source Intellectual Property (IP) and associated CIS, and/or negotiate requisite IP agreements as appropriate, from PACCSAP, COSPPac, RoK-PI-CLIPs, FINPAC and other regional CIS programmes
- Negotiate and secure appropriate national climate data access agreements with key stakeholders during project Inception Phase
- Finalise details and implement relevant project activities during Inception Phase/Year 1 to undertake initial SEB analysis to establish baseline triple-bottom-line assessment data/metrics
- Ensure project/programme design and implementation based on effective Monitoring & Evaluation planning framework

Proposed mitigation response will lower the probability of risk occurring to Low

<b>Selected Risk Factor 3</b>			
Description	Risk category	Level of impact	Probability of risk occurring
Lack of focus and alignment with national/regional initiatives	Technical and operational	High (>20% of project value)	Low
Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>Key risk mitigation response measures:</p> <ul style="list-style-type: none"> <li>• Undertake key stakeholder engagement/consultation and environmental scanning during programme inception phase to identify relevant regional and national/sub-national strategies, programmes/initiatives and associated priorities upon which the case studies will be based/aligned and/or integrated with</li> <li>• Environmental scanning to elucidate priorities, to include relevant JNAPS, NAPAS, PMC-PICS panel priorities and planning, GFCS implementation priorities and planning, other regional climate-related programming priorities, sectoral plans and priorities, etc.</li> <li>• Ensure project/programme design and implementation based on effective Monitoring &amp; Evaluation planning framework</li> </ul> <p>Proposed mitigation response will maintain the probability of risk occurring as Low</p>			
<b>Selected Risk Factor 4</b>			
Description	Risk category	Level of impact	Probability of risk occurring
Inability to transfer knowledge and replicate learnings in other Pacific SIDS	Technical and operational	High (>20% of project value)	Medium
Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>Key risk mitigation response measures:</p> <ul style="list-style-type: none"> <li>• Ensure the project/programme design has appropriate level of investment and resourcing in communications, knowledge brokering, outreach and associated stakeholder engagement, as well as</li> </ul>			

in-country capacity development, to facilitate extension and application of national project learnings to other countries as part of the regional programme

- Ensure the project develops and implements a communications and knowledge brokering plan incorporating targeted stakeholder engagement to facilitate national and regional support for the initial project in Vanuatu and future projects as part of the regional programme
- Design the exit strategy for the close-out of each of the national projects to facilitate a seamless transition to concurrently developing and implementing the next national project in other Pacific SIDS on an overlapping, staged basis over a ten year term
- Establish and maintain a regional CIS ‘alumni’ of partner PICs in the form of a Pacific regional CIS Community of Practice to facilitate long-term sustainability of CIS outcomes
- Ensure project/programme design and implementation based on effective Monitoring & Evaluation planning framework

Proposed mitigation response will lower the probability of risk occurring to Low

**Selected Risk Factor 5**

Description	Risk category	Level of impact	Probability of risk occurring
Insufficient resources to effectively and efficiently implement project/programme, communicate key findings, facilitate outreach and realise specified outcomes & impacts	Financial	High (>20% of project value)	Low

Mitigation Measure(s)

*Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?*

Key risk mitigation response measures:

- Ensure the project/programme design has appropriate level of investment and resourcing in communications, knowledge brokering and outreach, as well as in-country capacity development, to facilitate replication and application of national project learnings to other partner PICs
- Ensure that all project activities incorporate relevant cross-cutting aspects of communications, knowledge management and outreach at Component/Sub-Component level in a complementary manner with programme level planning and development.
- Ensure project/programme design and implementation based on effective Monitoring & Evaluation planning framework

Proposed mitigation response will lower the probability of risk occurring to Low

<b>Selected Risk Factor 6</b>			
Description	Risk category	Level of impact	Probability of risk occurring
Project/Programme not appropriately designed to address objectives and to realise/sustain expected long-term outcomes and impacts	Technical and operational	High (>20% of project value)	Low
Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>Key risk mitigation response measures:</p> <ul style="list-style-type: none"> <li>• Ensure project/programme design and implementation based on fit-for-purpose, logical (theory-of-action)-based Monitoring &amp; Evaluation Planning framework</li> <li>• Project/programme design to be informed by key stakeholder consultation to identify/validate CIS (and associated capacity) gaps and needs for nationally determined priority sectors</li> <li>• Project/programme level M&amp;E Planning framework to be complementary with GCF Performance Management and Result Monitoring Framework and specifically contribute to hierarchy of GCF outcomes and impacts</li> <li>• Ensure that project/programme design and resource allocation provides requisite support for addressing CIS needs and building in-country capacity customized/tailored for target Next/End-Users such that practice change around use of CIS becomes mainstreamed on transformational basis within priority sectors</li> <li>• Undertake real-time M&amp;E at all stages and at all levels, including to activity (Component) level throughout the delivery of the project/programme, and provide ongoing real-time feedback to project/programme activity design, resourcing and work plan scheduling as appropriate</li> <li>• Ensure that M&amp;E measures appropriate (Specific/Measurable/Attainable/Realistic/Timely) Key Performance Indicator metrics to assess agreed key outputs, outcomes and impacts</li> </ul> <p>Proposed mitigation response will maintain the probability of risk occurring as Low</p>			
<b>Selected Risk Factor 7</b>			
Description	Risk category	Level of impact	Probability of risk occurring
ES risk identified during screening processes and that may arise during implementation is not managed adequately.	Social and environmental	Low (<5% of project value)	Low

Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>Key risk mitigation response measures:</p> <ul style="list-style-type: none"> <li>• While there are no significant Environmental and Social Risks associated with the project, the project will adopt an ES mainstreaming approach where environmental and social risk is considered at all planning and decision points. This will be overseen by SPREP as the accredited entity for the project</li> <li>• The project will observe non-discriminatory recruit processes, as well as occupational health and safety requirements (as required under Vanuatu and SPREP policies)</li> <li>• The project will adopt designs and approaches which are attuned to the needs of men and women, in the activity specific context, and collect gender disaggregated data.</li> </ul> <p>Proposed mitigation response will maintain the probability of risk occurring as Low</p>			
Other Potential Risks in the Horizon			
<p><i>Please describe other potential issues which will be monitored as “emerging risks” during the life of the projects (i.e., issues that have not yet raised to the level of “risk factor” but which will need monitoring). This could include issues related to external stakeholders such as project beneficiaries or the pool of potential contractors.</i></p> <p>Other potential issues which may emerge as risks during the life of the project/programme include:</p> <ul style="list-style-type: none"> <li>• Potential disruption to project delivery impacting local capacity due to natural disasters such as tropical cyclones, earthquakes, tsunami and volcanic eruptions</li> </ul>			

*\* Please expand this sub-section when needed to address all potential material and relevant risks.*

## H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's [Performance Measurement Framework](#) under the [Results Management Framework](#).

### H.1.1. Paradigm Shift Objectives and Impacts at the Fund level<sup>12</sup>

#### Paradigm shift objectives

<i>Increased climate-resilient sustainable development</i>	<p>Please elaborate on the paradigm shift objectives to which the project/ programme contributes:</p> <p>The project will contribute to the GCF Paradigm shift potential objectives in two measurable ways. First the project will transform policy, planning and project delivery process in Vanuatu to incorporate best available CIS information. This will ensure informed climate 'smart' decision making to facilitate climate resilient development (including adaptation and DRR planning) processes. Secondly and related to the first point the project will catalyze (through the development and demonstration of applied CIS) mainstream application of CIS in development processes on a sustainable, long term basis.</p>
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Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	

Fund-level impacts: Note the CIS capacity, products and infrastructure delivered by the project are designed to support the mainstream integration of CIS information into decision-making as part of key policy, planning and development processes in Vanuatu. Through its integration, uptake and application, the project will support more resilient development in a number of direct and indirect ways. Collection of relevant socio-economic data and information in the form of surrogate performance metrics to serve as evidence of how the project has influenced development decisions, with more resilient outcomes and impacts, will be collected throughout delivery. Further through the proposed SEB analysis (Sub-Component 3.6), the value of CIS against key social, environment and economic indicators will be modelled, analysed and reported against baseline conditions, based on real input data to demonstrate impact on a population-wide basis (though scalable to Household levels).

Assessment of change against baseline condition during period of project intervention will include development, monitoring and assessment of appropriate suite of quantitative and qualitative, triple bottom line metrics. This will be estimated specifically for CIS-related impacts through the proposed Socio-Economic Benefit (SEB) Analysis undertaken as part of Sub-Component 3.6. Specifically the SEB analysis will use the raw data from the Chamber of Commerce and the Bureau of Statistics as

<sup>12</sup> Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that [some indicators are under refinement](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf)): [http://www.gcfund.org/fileadmin/00\\_customer/documents/Operations/5.3\\_Initial\\_PMF.pdf](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf)

proxy metrics for estimating CIS related impacts at national, provincial and local community (household) level due to CIS project intervention over the course of the national project (4 yrs) and beyond over the course of the regional program (> 4yrs funding permitting).

The SEB analysis will establish the baseline using transformed raw data from the Chamber of Commerce and the Bureau of Statistics according to the Cost-Benefit Framework developed as part of the Readiness project. There are three main steps for estimating the baseline, viz> 1) collection of all relevant data including existing/baseline socio-economic data (see also F.1) and baseline CIS condition (see also Section C.2), 2) create series of social, economic, environmental projections against specified climate impacts and CIS scenarios and 3) integrate these data into GTAP modelling to generate an internally consistent/standardised baseline for comparisons against overtime. The baseline condition will be characterized by:

- Household welfare: including changes in income, food affordability, savings and consumption patterns
- Sectoral status: including changes in output, productivity, profitability and demand, and
- National economy and welfare: including changes in costs of climate related natural disasters (loss and damage in lives, recovery and infrastructure replacement and maintenance), lost GDP and terms of trade, tax revenue/burden, employment, foreign aid investment etc

<p><i>A1.0 Increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions</i></p>	<p>Headline metrics:</p> <p>1.0 * Total Number of direct and indirect beneficiaries; Number of beneficiaries relative to total population (sex disaggregated)</p> <p>1.1 Change in losses of lives and loss and damage of/to key assets and associated (US\$) due to the impact of climate extremes and associated natural disasters in Vanuatu</p>	<p>1.0 Activity based reporting, to collect numbers, particularly around engagement through the community climate change centers and case studies. Mid-term/final evaluation &amp; SEB drawing on community surveys and other appropriate methods</p> <p>1.1 Project case-study and activity data demonstrating number of people/communities / infrastructure who have been directly supported through CIS to take preparatory actions or have improved access to early warning data and information. Mid-term/final evaluation &amp; SEB drawing on community surveys and other appropriate methods</p> <p>SEB to draw on: National level &amp; sectoral based eg. Volume and terms of trade (import/export) for agriculture, incoming</p>	<p>1.0</p> <p>0 beneficiaries of project at commencement</p> <p>1.1 / 1.2 Baseline effectively as indicator is linked to delivery of project activities. methods to be established and linked to further programming and delivery of specific activities</p>	<p>Target number of direct beneficiaries = 87,000 with at least 55% being women</p> <p>1.1 Substantive trend increase over baseline condition in specified key indicator metrics by completion of the project and/or with substantive increase over baseline condition reasonably expected within 3-5 years of completion of the project</p>	<p>Communities and target beneficiaries are wanting to engage with the CIS on offer.</p> <p>The CIS leads to actual livelihood benefits for individuals and community</p>
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		<p>visitors, length of stay &amp; expenditure for tourism etc</p> <p>Provincial level household improved income generating activities, welfare by age/gender/education/special vulnerable groups These data are existing and collated routinely by the Vanuatu Chamber of Commerce (in relation to national level economic parameters for key sectors) and by the Vanuatu Bureau of Statistics through the existing Household Expenditure Survey which provides Provincial explicit data )</p>				
<p><i>A2.0 Increased resilience of health and well-being, and food and water security</i></p>	<p>2.2 Number of food secure households, including gender ratio where possible, (in areas/periods at risk of climate impacts)</p> <p>2.3 Number of water secure households, including gender ratio where possible,(in areas/periods at risk of climate impacts)</p>	<p>2.2 Sector specific project activity and case study data and information on the uptake of CIS to support more productive and year round production of food in communities associated with the climate change centers. Mid-term/final evaluation &amp; SEB drawing on community surveys and other appropriate methods</p> <p>2.3 Sector specific project activity and case study data and information on uptake of CIS to inform water planning and management at community and sector level. Mid-term/final evaluation &amp; SEB drawing on community surveys and other appropriate methods</p> <p>One of the first activities to be carried out by each sector is the confirmation of data that would not be collected by the SEB; either these are routinely collected by the relevant sector(s) in this case water, agriculture, but more specifically to work out with the key sectors how indicator information related to the use or without the use of CIS for decision-making is to be collected, analysed and reported on as part of the case studies and</p>	<p>2.2 Baseline and methods to be established and linked to further programming and delivery of specific activities (see above and Sub-Component 3.6)</p> <p>2.2. Zero. Baseline and methods to be established and linked to further programming and delivery of specific activities (see above and Sub-Component 3.6)</p>		<p>80% of agricultural based households within community center and case study catchment areas have changed production (or related practices due to access to CIS), with a focus</p> <p>At least one substantial piece of sectoral planning / policy / regulation (or processes) integrates relevant CIS for improved management for each of the water, fishery and agricultural sectors</p> <p>Substantive trend increase over baseline condition in specified key indicator metrics by completion of the project and/or with substantive increase over baseline condition reasonably expected within</p>	<p>Communities and target beneficiaries are wanting to engage with the CIS on offer.</p> <p>The adoption of CIS leads to actual livelihood benefits for individuals and community</p>



		the outcomes reporting system for the project.			3-5 years of completion of the project	
<i>A3.0 Increased resilience of infrastructure and the built environment to climate change</i>	3.1 Number and value of physical assets made more resilient to climate variability and change considering human benefits .	<p>3.1 Sector specific project activity and case study data and information demonstrating CIS uptake at national/provincial/community level including based on improved policy planning and practices as verified by the Department of Infrastructure. Mid-term/final evaluation &amp; SEB</p> <p>3.1 data and information from the Department of works on uptake of CIS resulting in new infrastructure developments (or maintenance) with climate proof design based on CIS provided through the project, including across tourism, water, agriculture and fisheries sectors. Mid-term/final evaluation &amp; SEB</p> <p>3</p>	<p>CIS currently used in an ad-hoc way in development infrastructure projects if at all, and with incomplete and inconsistent access and application across target Next-End-user groups.</p> <p>To be confirmed at the beginning of the project and what to be collected through the SEB and/or collected from other sources.</p>		<p>100% of building codes/conditions/policies and plans for climate resilient infrastructure (suitable for relevant climate hazards - type and magnitude) have been strengthened.</p> <p>At least 5 (1 per sector) examples where CIS has been used to enhance the planning/design of infrastructure, as a result of project CIS.</p>	<p>Gov/communities are willing to change planning and design practices based on incorporation of CIS</p> <p>There is scope to amend regulatory/legislative etc instruments during the scope of the project.</p> <p>The infrastructure sector collaborates with the project through proposed case study and participate in the SEB, including in order to establish the detailed baseline.</p> <p>Collaborations with other sector-based case studies and related projects in Vanuatu to share data and information.</p> <p>Private sector, including consulting engineers have capacity to design and build climate proof infrastructure</p>

<i>A4.0 Improved resilience of ecosystems and ecosystem services</i>	<p>4.1 Coverage/scale of natural ecosystems protected and strengthened in response to climate variability and change</p> <p>4.2 Value (US\$) of ecosystem services generated or protected in response to climate change</p>	<p>4.1 Activity and case study data and information demonstrating the use of CIS (and related ecosystem data) has been used to information management practices and decisions including around fisheries and agricultural production practices.</p> <p>4.2 The SEB will produce economic indicators associated with the application of CIS to help protect and manage ecosystems.</p> <p>Mid-term/final evaluation &amp; SEB including consideration of State and capacity reports before project intervention from the following areas:</p>	<p>The extent (and value) of ecosystem vulnerability in Vanuatu is unclear based on existing information. The project will measure from a baseline of Zero, in order to quantify and qualify the extent to which the project has supported better management outcomes (including a measure of spatial coverage and value)</p>		<p>At least one substantial piece of community-based planning that integrates relevant CIS for improved management of inshore fisheries and/or reefs, and/or land-based natural resources in each of five provinces</p>	<p>Target communities are willing to alter behaviors and practices based on incorporation of CIS</p> <p>There is a strong collaborations with the agricultural and fishery sectors at every level (national/provincial/community) for information collection and reporting</p>

### H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
<b>Project/ programme outcomes</b>	<b>Outcomes that contribute to Fund-level impacts</b>					
<i>A5.0 Strengthened institutional and</i>	5.1 Institutional and regulatory systems, policies and plans that improve	Data and information collected through Sector specific stakeholders	To be specified though delivery of Activity 1.1 in		Each of the 5 target sectors have establish substantial and effective	Sector authorities are willing to adopt new governance, institutional, regulatory and

<p><i>regulatory systems for climate-responsive planning and development</i></p>	<p>incentives for climate resilience and their effective implementation</p> <p>5.2 Number and level of effective coordination mechanisms</p>	<p>demonstrating integration of CIS including associated with activity and case study data and information and sector specific reporting on adoption of new governance, institutional and regulatory mechanisms which promote and facilitate the integration and application of CIS data and information in sector planning, policy and delivery.</p> <p>Mid-term/final evaluation.</p>	<p>particular, with emphasis on mapping of existing institutional arrangements and capacity relating to CIS use.</p>		<p>institutional and regulatory systems of the uptake and application of CIS.</p> <p>Substantive increase over baseline condition in specified key indicator metrics by completion of the project and/or with substantive increase over baseline condition reasonably expected within 3-5 years of completion of the project</p>	<p>other mechanisms to ensure mainstreaming of CIS in planning and decision making.</p> <p>Core national baseline data relevant to specified indicators are available and accessible from relevant sectors Project-based activity designed to undertake triple bottom-line assessment of project impact is appropriately resourced and implemented Project level scope and scale of project-based activity, including capacity development, is sufficient to realise expected sustainable project/programme-level outcomes and impacts</p>
<p><i>A6.0 Increased generation and use of climate information in decision-making</i></p>	<p>6.1 Use of CIS in decision-making in climate sensitive sectors</p>	<p>6.1. Data and information collected associated with the sector specific activities as well as use of appropriate investigative methodologies through the mid-term and final evaluation.</p> <p>6.1Activity and case study data and information including number of key CIS products developed and applied by target sectors.</p> <p>Mid-term/final evaluation &amp; SEB</p> <p>Sector reports/policy/sector resilient outcomes achieved</p>	<p>Project specific baseline established in Activity 1.1</p>		<p>All 5 development sectors increase use of CIS in decision making for practical outcomes supporting resilient development</p> <p>VMGD has established capacity for ongoing generation of in-demand CIS products and services.</p> <p>Substantive increase over baseline condition in specified key indicator metrics by completion of the project and/or with substantive increase over baseline condition reasonably expected within 3-5 years of completion of the project</p>	<p>Sector authorities are willing to adopt new governance, institutional, regulatory and other mechanisms to ensure mainstreaming of CIS in planning and decision making.</p>

<p><b><i>A7.0 Strengthened adaptive capacity and reduced exposure to climate risks</i></b></p>	<p>7.1 Use by vulnerable households, communities, businesses and public-sector services of Fund supported tools, instruments, strategies and activities to respond to climate change and variability CIS-informed decision support tools, risk assessments, planning instruments, strategies and activities to respond to climate impacts</p> <p>7.2 Number of males and females reached by [or total geographic coverage of] CIS support including CLEWS, seasonal forecasts and multi-decadal projections) and other climate adaptation and risk reduction measures established/strengthened</p>	<p>7.1 Data and information collected associated with the sector specific case studies and activity data and information demonstrating uptake of CIS at the different sector level</p> <p>Evaluative/baseline studies associated with the development and application of the project CLEWs.</p> <p>Mid-term/final evaluation &amp; SEB</p>	<p>Project specific baseline to be determined through development of case studies</p>		<p>80% of population in case study/community centers catchment demonstrating engagement with and adopting more resilient practices or have increased capacity to respond to short and long term onset climate change, with a focus on ensuring women’s specific adaptive capacity needs are addressed.</p> <p>Project CLEWs reach at least (in terms of coverage) 70% of the total population, particularly those most vulnerable across sectors and across hazard type.</p> <p>Substantive increase over baseline condition in specified key indicator metrics by completion of the project and/or with substantive increase over baseline condition reasonably expected within 3-5 years of completion of the project</p>	<p>Communities are interested and willing to change behavior based on CIS</p> <p>EWS is considered as a composition of four dimensions 1) knowledge of risk 2) monitoring and warning services 3) dissemination and communication 4) response capability.</p>
<p><b><i>A8.0 Strengthened awareness of climate threats and risk-reduction processes</i></b></p>	<p>8.1 Number of households including male and female made aware of climate threats and related appropriate responses</p>	<p>Data and information associated with case studies and community centers and other activities to be explored and verified through evaluations.</p> <p>Mid-term/final evaluation &amp; SEB</p>			<p>70% of population reached in terms of access to new and tailored CIS (including through TV, radio and other communications activities) Each sector demonstrates increased awareness at key policy, planning and decision</p>	<p>Communications products of project are engaging and provide practical information and guidance for communities.</p>

					<p>making points by the end of the project.</p> <p>Substantive increase over baseline condition in specified key indicator metrics by completion of the project and/or with substantive increase over baseline condition reasonably expected within 3-5 years of completion of the project</p>	
<i>Specify other expected results</i>	To be refined during inception phase/					
<p><b>Project/programme outputs</b> (see also Attachment 5a-e for detailed list of outputs – summarized into 6 key groups below)</p>	<p><b>Outputs that contribute to outcomes</b></p> <ul style="list-style-type: none"> <li>• <b>Key Output 4:</b></li> </ul>					

<p><b>Multiple Next/End-user engagement and capacity development activities including new sector specific CIS action plans, guidance materials and databases, technical training, advisory and assessment workshops, mentoring and attachments and other miscellaneous in-country exchanges</b></p>	<p>To include but not limited to number, type &amp; quality of in-country missions, meetings, workshops &amp; numbers of actual participants re same</p>	<p>Quarterly Progress Reports tracking key activities and deliverables, milestone compliance and quality control (incl. timeliness, accuracy and completeness).</p>	<p>Existing IP as specified by Terms and Conditions of the Head Agreement with GCF</p> <p>Project-based activity to be undertaken</p> <p>initially in first year to establish methods and baseline conditions consistent with GCF Performance</p> <p>Measurement and Results Management Frameworks, as well as the Project/Programme (logic-based theory-of- action) Monitoring and Evaluation Plan</p>	<p>Agreed programme level workplan and deliverables and milestones as specified by Terms and Conditions of the Head Agreement with GCF, including relevant Schedules of Activity, Annexures, etc.</p>	<p>As above</p>	<p>As per Section H.1.1 and 1.2</p>
<p><b>Suite of sector specific CIS development case studies (at least one per sector for term of project) which provide the platform for development, delivery, application and demonstration of CIS tailored to the adaptation needs and</b></p>	<p>As above</p> <p>To include but not otherwise limited to:</p> <p>Number, type and quality of national/sectoral level case studies, number of national/sectoral level H/R/V and SEB assessments, number and type of tailored data sets/CIS generated/utilised</p>	<p>Established before project with sectors</p>	<p>As above</p>	<p>As above</p>	<p>As above</p>	<p>Sector buy in and ownership, partnership and collaborations</p>

<p><b>resilient planning and development roles of target Next/End-Users including based on tailored H/R/V assessment and associated climate and weather data.</b></p>						
<p><b>Digitised and quality controlled observational and related/ancillary socio-economic data secured and accessible within functional CDMS (including appropriate analysis/report applications) and/or other relevant databases ready for uptake and application by climate adaptation and disaster risk management planners and policy makers.</b></p>	<p>As above</p> <p>To include but not otherwise limited to:</p> <p>Number, type and quality of data records secured/digitized &amp; quality controlled, number and type of analyses</p> <p>completed/reports generated, number and type of observational stations and networks maintained</p>	<p>State of sector data/information management capacity and systems</p>	<p>Sector assessment reports</p>	<p>As above</p>	<p>As above</p>	<p>As above</p>
<p><b>Down-scaled and/or regionally specific CLEWS, sub-seasonal/seasonal forecast and long-term projections data and information tailored to sectoral Next/End-user adaptation and disaster</b></p>	<p>As above</p> <p>To include but not otherwise limited to: number, type and quality of national/sub-national, seasonal/sub-seasonal forecasts and long-term projections generated for each country/case study/sector</p>	<p>VMGD capacity before project intervention</p>	<p>VMGD reports and plans</p>	<p>Change of capacity mid term</p> <p>Level of sector uptake/application of CIS midterm</p>	<p>Change of capacity end of project</p> <p>Level of sector uptake/application of CIS final evaluation</p>	<p>VMGD collaboration in early establishment of baseline and project indicator formulation</p>

<p><b>risk management policy development and planning needs and roles.</b></p>						
<p><b>Suite of customized communication, capacity development and outreach resource materials including communication and media products, training materials, climate management tools, portals and Decision Support Systems, hands-on expert technical support, and full suite of documentation and web-based capability and content for building capacity, for raising awareness and visibility and for improved adaptation and resilience planning and development</b></p>	<p>As above</p> <p>To include but not otherwise limited to:</p> <p>number, type and quality of</p> <p>CIS generated for national/sub-national, seasonal/sub-seasonal forecasts and long-term projections for each country/case study/sector/assessment, and number and type of communications and capacity development activities produced and/or undertaken</p>	<p>Regular M&amp;E reports (annual reports)</p>	<p>Access to and availability of resources before project intervention and during project intervention</p>	<p>As above</p>	<p>As above</p>	<p>Needs identify/established early in the project to guide resource development</p>
<p><b>New weather and climate infrastructure for enhancing development and delivery of CIS in Vanuatu, including new IT and observational infrastructure for VMGD (including Doppler radar installation), new sensors and associated measuring instruments</b></p>	<p>To include but not otherwise limited to:</p> <p>Number, type and quality of programme level systems and procedures, documentation and reports, level of compliance with Terms and Conditions of</p>	<p>Sector initial assessments and establishment/confirmation of baseline/capacity and gaps in current processes and procedures</p>	<p>As above</p>	<p>As above</p>	<p>As above</p>	<p>All key sectors assess identify the strength and gaps in existing governance systems early in the project</p>



<p><b>for fine spatial scale data collection in and around designated climate (vulnerability) hot spots, and new communications infrastructure for real-time delivery and outreach of CIS to local communities (including Community Climate Change Centers).</b></p>	<p>GCF Head Agreement, KPIs of project/programme level monitoring and evaluation plan and GCF Results assessment and performance management framework</p>					
Activities	Description	Inputs			Description	
<b>Component 1: Capacity Development</b>						
<p><b>Sub-Component 1.1:</b> Review existing Vanuatu Government policy, planning &amp; associated nstitutional/governance arrangements</p>	<p>Environmental scan and systems analysis of existing institutional arrangements Review report documentation &amp; stakeholder engagement Sectoral CIS action plans &amp; communications</p>	<p>Indicative GCF funding US\$0.164m</p>			<p>Financial resources of GCF and collaborative (regional and national) Execution Entities; existing IP and infrastructure (coinvestment) from collaborative Delivery Partners including existing national and regional CIS IP (incl.PCCSP/PACCSAP &amp; COSPPac) SPREP &amp; VMGD.</p>	
<p><b>Sub-Component 1.2</b> Delivery of stand-alone training and on-the-job support for application of CIS</p>	<p>Sector specific training resources, handbooks &amp; guidance materials for deployment across relevant Components/Sub-components Organisation, delivery, facilitation and reporting of Next/End-user CIS outreach workshops (each for up to 30-40 people): 1 x 5 day national/sectoral workshop/yr 5 x 2 day provincial workshops/yr 10 x 1 day community workshops/yr</p>	<p>Indicative GCF funding US\$1.36m</p>			<p>As above</p>	
<p><b>Sub-Component 1.3</b></p>	<p>Planning workshop during Inception Phase followed by engagement workshops with all Next/end-User Groups; supervision, coordination, facilitation and reporting of case study implementation across all sub-components and Next/End-Users; Additional travel in Yr1 to support sectoral</p>	<p>Indicative GCF funding US\$0.164m</p>			<p>As above</p>	

Pilot project/case-studies developed and implemented	coordinators establish case studies with sectoral stakeholders		
<b>Sub-Component 1.4</b>  Establishment of Vanuatu network of community-based CIS champions	2 x Community Climate Change Centres in each of up to 5 x provinces; to include new and/or upgraded infrastructure, IT & comm's support Established community-based 'citizen science' networks for each Centre	Indicative GCF funding US\$0.350m	As above
<b>Sub-Component 1.5</b>  Establishment of graduate/post-graduate level research training and mentoring	Up to 3 x annual scholarships (graduate/post-graduate) and/or formal accredited traineeships within VMGD Mentoring & attachments for VMGD	Indicative GCF funding US\$0.350m	As above
<b>Sub-Component 1.6</b>  Provision of enhanced, expert CIS Help-Desk support	Real-time back-office expert help-desk support across Delivery Partners Customised information/advisories in relation to IPCC 5 <sup>th</sup> Assessment Report implications for Vanuatu Government policy and international negotiations (see also 1.1)	Indicative GCF funding US\$0.220m	As above
<b>Sub-Component 1.7</b>  Skills-based training of Doppler radar operators and maintenance technicians in VMGD	Skills-based training of radar operators and maintenance technicians Development of standard operating protocols	Indicative GCF funding US\$0.500m	As above
<b>Component 2: User Interface Platform</b>			
<b>Sub-Component 2.1</b>	5 x sectoral short videos on application of CIS Upgraded CIS content for Vanuatu Climate Watch including via VCUs and VCSs	Indicative GCF funding US\$0.635m	Financial resources of GCF and collaborative (regional and national) Execution Entities; existing IP and infrastructure (co-investment) from collaborative Delivery Partners

Development & delivery of new & innovative CIS communication products	Other CIS communications and media 'collateral' and associated guidance materials customized for all target Next/End-user groups Operational TK database for input to CIS content where appropriate Local language translations for relevant CIS content		including existing national and regional CIS IP (incl.PCCSP/PACCAP & COSPPac) SPREP & VMGD
<b>Sub-Component 2.2</b>  Adapt (from existing) & deliver new customized CIS DSS processes & tools	Updated climate hazard hotspot risk assessments for priority sectors Customised and operational sectoral CIS-based Decision Support Systems (DSS) including risk assessment methodologies, guidance materials and visualized databases where appropriate; hard/soft copy and/or on-line format where appropriate Documented application and evaluation of DSS and associated resources as part of five sectoral case studies across all relevant Next/End-users	Indicative GCF funding US\$0.225m	As above
<b>Component 3: Climate Information Services System</b>			
<b>Sub-Component 3.1</b>  Delivery of all on-line CIS outputs including more customized access for DSS tools & processes	Upgraded IT platform including computing hardware and software to support all relevant CIS data, information, DSS tools, knowledge products etc interfaced with existing NAB/VMGD, CliDE data management system and other Pacific IT climate platforms/portals and communications infrastructure	Indicative GCF funding US\$0.435m	As above
<b>Sub-Component 3.2</b>  Development of a <i>Vanuatu Climate Futures</i> portal	New Vanuatu Climate Futures portal customized to facilitate CIS-based regional multi-decadal projections for Vanuatu Assimilation of on-line training materials and guidance materials for accessing and applying projections for risk assessments across five sectors Interface with Vanuati CIS IT platform as appropriate (see 3.1)	Indicative GCF funding US\$0.335m	As above
<b>Sub-Component 3.3</b>	CliDE data management system (hardware and software) and all relevant data portals updated to incorporate all	Indicative GCF funding US\$0.180m	As above

<p>Update currency, functionality &amp; visualization of Vanuatu climate data records</p>	<p>quality controlled data including from AWS where appropriate (see also 4.3) Analysed/visualized and synthesized/summarized data sets, interfaced with EWS and/or risk assessment templates where appropriate</p>		
<p><b>Sub-Component 3.4</b>  Development &amp; implementation of IT &amp; associated communication platforms for sector-based multi-hazard 'impact' CLEWS</p>	<p>Developed and deployed/operational EWS systems featuring real-time wave buoy data (one-off), sea level pressure sensors (10 off; 2 in each of five provinces), and upgraded stream and rainfall gauges for existing at risk ('hotspot') communities, catchments, coastlines and infrastructure Customised phone app(s) developed and commissioned for real-time uploading of EWS data and rainfall data from existing observer network Integrated on-line, mobile phone, media (radio/TV) and social media platform (software and hardware) for communications of EWS notifications to all Next/End-users CliDE/CliDEsc software applications developed and deployed to facilitate real-time, visualised CIS data access for relevant EWS Infrastructure (hard and soft) maintenance support Backup systems for EWS including data storage, power supplies and communication systems across Next/End-user network</p>	<p>Indicative GCF funding US\$1.05m</p>	<p>As above</p>
<p><b>Sub-Component 3.5</b>  Development &amp; delivery of web-based DSS to inform the agricultural sector</p>	<p>DSS for multiple crops and cropping systems customized for ag sector Next/End-users using multiple on-line and off-line IT platforms and software, including web-based, PC-based and phone app-based back-office and field applications for both downloading and uploading, analyzing and summarizing visualized data in real-time where appropriate DSS interface with CliDE database, VMGD/NAB portals and other VMGD products including Climate Watch, VCUS and VCSs</p>	<p>Indicative GCF funding US\$0.355m</p>	<p>As above</p>
<p><b>Sub-Component 3.6</b>  Undertake Socio-Economic Benefit (SEB) analysis for Vanuatu using customized</p>	<p>Annual/Final assessment of CIS cost-benefit quantified and reported Enhanced socio-economic (triple bottom-line/social, economic and environmental) data base from Vanuatu Chamber of Commerce (additional in-country support provided to collect and collate) raw data customized for five</p>	<p>Indicative GCF funding US\$0.305m</p>	<p>As above</p>

Pacific CIS Cost-Benefit Framework (CBF)	<p>priority sectors with back-office analysis, synthesis and visualization for quantifying and reporting relevant metrics against performance criteria</p> <p>Value-added data inputs to facilitate implementation of (mid and final term) project M&amp;E including to inform GCF Performance reporting criteria</p>		
<b>Component 4: Observations and Monitoring</b>			
<p><b>Sub-Component 4.1</b></p> <p>Digitise high quality daily/sub-daily data from archived paper records for key climate parameters</p>	<p>Complete data rescue/digitization for all available national/sub-national records of key climate variables, including data entry and quality control</p> <p>Updated standardized WMO Climate Extreme Indices for incorporation into CIS knowledge products and relevant portals (see also 1.2.1, 2.1, 3.2 &amp; 3.3)</p>	Indicative GCF funding US\$0.210m	Financial resources of GCF and collaborative (regional and national) Execution Entities; existing IP and infrastructure (co-investment) from collaborative Delivery Partners including existing national and regional CIS IP (incl.PCCSP/ PACCSAP & COSPPac) SPREP & VMGD
<p><b>Sub-Component 4.2</b></p> <p>Collect new (inshore) bathymetric &amp; coastal topographic data for high risk climate 'hot spots'</p>	<p>Compatible LIDAR sensor (one off) for existing drone mapping system</p> <p>New LIDAR and satellite imagery coastal bathymetry and catchment topography and associated GIS data sets</p> <p>Analysed, synthesized data sets assimilated into/real-time interfaced with CIS products and services (Component 2), EWS and DSS systems (Component 3) and model-based forecasts and projections outputs (Component 5) where appropriate</p> <p>Deploy GPS</p> <p>New 'citizen-science' database interfaced with coastal and catchment mapping databases</p> <p>Backpack-based GPS coastline mapping units (two off) for deployment in association with citizen science 'shoreline' and coastal resource data mapping</p>	Indicative GCF funding US\$1.145m	As above
<p><b>Sub-Component 4.3</b></p> <p>Undertake development &amp; maintenance of existing VMGD weather &amp; climate infrastructure</p>	<p>Upgrade security, reliability and annual maintenance of existing Automatic Weather Stations (AWS)</p> <p>Replace/add new AWS as appropriate to ensure adequate CIS coverage for designated 'hotspots' relevant to sectoral case studies</p> <p>Populate CliDE with AWS data via new interface (see also 3.3) and rainfall data from new phone app customized for existing rainfall observer network (see also 3.4)</p>	Indicative GCF funding US\$0.955m	As above

	Automate data upload to CliDe for deployed stream level gauges including for Sarakata Reservoir as part of newly deployed flood-based EWS		
<b>Sub-Component 4.4</b>  Installation of new, automated stations for collecting core agro-met data in selected provinces/islands	New agro-met stations (3-5 off) deployed; up to one in each of 3-5 provinces (subject to priority/agreed crop types/systems for tailored crop forecasts New automated rain gauges linked to agro-met station telemetry network for real-time collection and reporting of data Maintenance and security of agro-met stations and rain gauges Data interface to CliDe and VMGD portals where appropriate	Indicative GCF funding US\$0.665m	As above
<b>Sub-Component 4.5</b>  Installation and commissioning of new Doppler radar system	Doppler radar installation (one off) and annual operation and maintenance costs for 4 yrs (term of the Van-CIS-RDP project)	Indicative GCF funding US\$6.550m	As above
<b>Component 5: Research, Modelling &amp; Prediction</b>			
<b>Sub-Component 5.1</b>  Improve understanding of large-scale climate processes influencing variability & extreme events	New model data and analysis on ENSO (and other large-scale climate processes) impacts on regional-scale climate variability and extreme relevant to Vanuatu CIS-based communication and knowledge products on interdependencies between ENSO (and other large-scale climate drivers), climate variability and extremes of relevance to Vanuatu (see also 1.2.1, 1.2.2, 1.6, 2.0, 4.0 and all other 5.0 sub-components) Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)	Indicative GCF funding US\$0.18m	Financial resources of GCF and collaborative (regional and national) Execution Entities; existing IP and infrastructure (co-investment) from collaborative Delivery Partners including existing national and regional CIS IP (incl.PCCSP/PACCSAP & COSPPac) SPREP & VMGD
<b>Sub-Component 5.2</b>  Develop new, & enhance existing multi-hazard (impact-based) CLEWS	New EWS for each of five priority sectors across six climate hazards and customized to inform relevant response mechanisms across target Next/End-user network EWS to be CIS-based with data sourced from relevant VMGD databases/portals via IT-based interface systems (see also 4.3) Specific EWS links to be developed and operationalized through	Indicative GCF funding US\$0.835m	As above .

	EWS communications network linked to existing NGO-based disaster response systems, including proposed new provincial Climate Change Community Centres (see also 1.4, 3.4 and 4.3 and all other 5.0 sub-components) Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)		
<b>Sub-Component 5.3</b>  Improve utility & functionality of existing seasonal climate impact forecasts	New sector-specific seasonal 'impact' forecasts out to 7-9 months initially; potentially with option for new multi-week forecasting capability Automated CliDE data interface to seasonal forecast modelling platforms where appropriate Impact forecasts customized to key sectoral risks around selected climate variables, including extreme rainfall and wind (i.e. storms, tropical cyclones), drought and extreme heat/fire weather, extreme sea levels and coral bleaching (see also 1.2.1, 1.2.2, 1.4, 1.6, 3.3, 3.5, 4.4, 5.1, 5.8) Multiple downscaling methods over seasonal timescales to be considered including statistical, dynamical and hybrid (combination) of methods (subject to forecast skill of existing modelling/analysis systems) Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)	Indicative GCF funding US\$0.835m	As above
<b>Sub-Component 5.4</b>  Develop & provide downscaled (<20km grid size) temperature, rainfall & tropical cyclone projections	Undertake new downscaling of regionally specific (national) GCM multi-decadal projections for relevant micro-climates at finer spatial scale in Vanuatu for key climate variables using most applicable methodology (including statistical, dynamical and/or combinations thereof); emphasis on climate vulnerable 'hot spots' (see also 2.2 and 4.2) Downscaled projections to be collated and validated for informing sector-specific application-ready data sets (see also 5.5) Access to back-office high speed computing infrastructure and observed station climate data is a critical requirement Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)	Indicative GCF funding US\$0.61m	As above
<b>Sub-Component 5.5</b>	Application of observed data sets to existing regionally specific (national) multi-decadal projections (direct GCM	Indicative GCF funding US\$0.61m	As above

<p>Develop tailored, application-ready climate projection data sets</p>	<p>and downscaled where appropriate – see 5.4 ) outputs for Vanuatu for relevant climate variables (hazards) for each of five sectors; emphasis on climate vulnerable ‘hot spots’ (see also 2.2 and 4.2) Collation, quality control and transformation of relevant data sets from existing VMGD databases and portals customized to specific Next/End-User needs such as climate smart design specifications for infrastructure building codes, coastal development planning, integrated coastal zone management, disaster risk reduction planning etc Download, analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate) Access to back-office high speed computing infrastructure and observed station climate data is a critical requirement Incorporation of supplementary ‘citizen science’ data where appropriate to ground-truth baseline bathymetry and topography Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)</p>		
<p><b>Sub-Component 5.6</b> Develop extreme sea level probabilities &amp; coastal inundation impact hazard maps for ‘hot spots’</p>	<p>Extreme sea level (coastal inundation) risk probabilities based on regionally specific (national) and downscaled (sub-national) multi-decadal projections for Vanuatu determined to underpin application-ready data sets (see also 5.5) inform risk assessments for sector specific climate change action plans and disaster risk reduction plans; emphasis on climate vulnerable ‘hot spots’ (see also 2.2 and 4.2) Collation, quality control and transformation of relevant data sets from existing VMGD databases and portals customized to specific Next/End-User needs such as climate smart design specifications for infrastructure building codes, coastal development planning, integrated coastal zone management, etc Download, analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate) Access to back-office high speed computing infrastructure and observed station climate data is a critical requirement</p>	<p>Indicative GCF funding US\$0.61m</p>	<p>As above</p>



	<p>Incorporation of supplementary 'citizen science' data where appropriate to ground-truth baseline bathymetry and topography</p> <p>Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)</p>		
<p><b>Sub-Component 5.7</b></p> <p>Undertake hydrodynamic assessment of coral reef 'health' &amp; vulnerability to slow-onset impacts of ocean warming &amp; acidification</p>	<p>Estimates return periods on multi-decadal time scales using regionally specific (national) GCM projections for Vanuatu for coral bleaching events based on coincidence of extreme SSTs and ocean acidification levels; to inform risk assessments for sector specific climate change action plans; emphasis on climate vulnerable 'hot spots' (see also 2.2 and 4.2)</p> <p>Develop new indices of coral reef-based ecosystem health as performance criteria for monitoring and management coastal reef and inshore fishery resources as quantifiable metrics and 'trigger points' for risk-based approach to integrated coastal management planning</p> <p>Download, analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate)</p> <p>Access to back-office high speed computing infrastructure and observed station climate data is a critical requirement</p> <p>Incorporation of supplementary 'citizen science' data where appropriate to ground-truth baseline bathymetry and topography</p> <p>Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)</p>	<p>Indicative GCF funding US\$0.61m</p>	<p>As above</p>
<p><b>Sub-Component 5.8:</b></p> <p>Develop &amp; apply climate impact models based on seasonal forecasts for production of key agricultural crops</p>	<p>Develop and apply new crop/cropping system specific modelling capability utilising most appropriate (validated skill) downscaling methods for generating agriculture sector impact forecasts on time scales out to several months (see also 3.5, 4.4 and 5.3)</p> <p>Collate, analyse and report field-based agro-met data including from field trials to validate forecast skill</p> <p>Download, analysis, validation, synthesis and reporting of application-ready data interfaced with relevant DSS and associated risk assessment frameworks (latter customized to sectoral needs where appropriate)</p> <p>Access to back-office high speed computing infrastructure and observed station climate data is a critical requirement</p>	<p>Indicative GCF funding US\$0.39m</p>	<p>As above</p>

	Ground-truthed CIS outputs and final outreach with/to target Next/End-users (see also 1.2, 1.3, 2.1 and 2.2)		
<b>Component 6: Implementation Arrangements</b>			
<b>Sub-Component 6.1</b>  Development and delivery of project level governance for Van-CIS-RDP implementation	Day-to-day management and administration, strategic planning, risk management, stakeholder engagement and relationship management, all progress reporting Supervision, coordination, implementation of logic framework and evaluation analysis and reporting, media engagement, procurement and financial management and reporting, meetings and workshops coordination and participation and logistics	Indicative GCF funding US\$2.200m	Financial resources of GCF for accredited Implementation Entity (SPREP) and Joint Execution Entities (SPREP & VMGD) for project management;

## H.2. Arrangements for Monitoring, Reporting and Evaluation

*Besides the arrangements (e.g. semi-annual performance reports) laid out in AMA, please provide project/programme specific institutional setting and implementation arrangements for monitoring and reporting and evaluation. Please indicate how the interim/mid-term and final evaluations will be organized, including the timing. Please provide methodologies for monitoring and reporting of the key outcomes of the project/programme.*

The Logic Framework set out in this proposal establishes a basis for the monitoring and evaluation of the project. Specific monitoring roles and responsibilities will be determined through the inception phase and work planning period and will sit with the two executing entities, SPREP and VMGD. During this period the logic model indicators will be further refined based on additional input for the targeted sectors. This will result in a detailed M&E plan which defines specific data and information to be collected for each of the Activity areas. The respective PMUs will have responsibility for ensuring key monitoring data, including necessary baselines, is collected through the implementation of project activities.

Basic activity, deliverable and milestone completion, and financial reporting will also be managed by the respective PMU's with necessary arrangements for distribution of financial data being establishing in the agreement between SPREP and the VMGD.

The case studies to be developed for each of the 5 priority sectors will also incorporate fit-for-purpose and targeted M&E plans so that the application of CIS through the sector studies can be fully understood. Key data collected will be managed by SPREP PMU, including through the project delivery partners.

SPREP PMU will be responsible for collating and reporting on key project activities and finances, for internal verification, through the SPREP Project Review and Monitoring Group (PRMG), for quality assurance and dissemination to the GCF, as required under the AMA and in alignment with the GCF monitoring and accountability framework.

SPREP will also commission independent evaluations at the mid-term (approx. July 2019), and end of term points, as required by the AMA. The evaluations will be tasked with developing an evidence bases assessment of how the project has delivered against it intended outcomes, as well as draw conclusions on the projects contribution to the GCF Impact Indicators, and address other aspects as per the AMA requirements. . The evaluations will be employ an appropriate suite of methodologies to ensure a participatory and learning approach.

The project M&E will also be informed by a SEB study as part of Component 4. This study will be consistent with recommended methodology of WMO (2015) to validate the economic rationale for the project investment, to provide valuable baseline and Key Performance Indicator (KPI) data as part of both the Project M&E and relevant components of the GCF PMF, and also to inform future programme investment and design decisions across the western tropical pacific SIDS. The SEB study would be undertaken intensively in the first year, concurrent with undertaking initial planning, stakeholder engagement and associated case study design,

capacity development, coordination and communication. The second and third years would be primarily to complete the case studies, measure and communicate impact through relevant KPIs, implement sustainability strategies and facilitate replication of the approach across further national partner countries within the western tropical Pacific as appropriate. The fourth and final year would be to complete the SEB study including final analysis and reporting and feed this information into the final evaluation for the national projects and the regional programme as appropriate.

## I. Supporting Documents for Funding Proposal

- NDA No-objection Letter (**Annex 1**)
- Feasibility Study (**Annex 2** – forthcoming pending completion of Readiness project deliverables)
- Integrated Financial Model that provides sensitivity analysis of critical elements (not applicable)
- Confirmation letter or letter of commitment for co-financing commitment (If applicable)
- Project/ Programme Confirmation/Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – see *the* Accreditation Master Agreement, Annex I (**Annex 3** – forthcoming subject to final GCF Secretariat approvals)
- Environmental and Social Impact Assessment (ESIA) or Environmental and Social Management Plan (refer to **Annex 4** , Environmental and Social Risk Screening summary)
- Appraisal Report or Due Diligence Report with recommendations (If applicable)
- Evaluation Report of the baseline project (not applicable)
- Map indicating the location of the project/programme (**Annex 5**)
- Timetable of project/programme implementation (**Refer to Section C 8**)
- Legal Opinion (**Annex 6** TBC)

*\* Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

Acronyms:

- ACCSP – Australian Climate Change Science Program
- ADB – Asian Development Bank
- APEC CC – Asia-Pacific Economic Community Climate Centre
- CSIRO – Commonwealth Scientific and Industrial Research Organisation
- CIS – Climate Information Science
- COSPPac – Climate and Oceans Support Program in the Pacific
- DSS – Decision Support System
- ENSO – El Nino Southern Oscillation
- ESRAM - Ecological and Social Resilience Assessments and Mapping
- FINPAC – Finnish Pacific Project
- GCF – Green Climate Fund
- GFCS – Global Framework for Climate Services
- IPCC AR5 – Intergovernmental Panel on Climate Change 5<sup>th</sup> Assessment Report
- JICA – Japan International Cooperation Agency
- PCCSP – Pacific Climate Change Science Program
- PACCSAP – Pacific-Australia Climate Change Science and Adaptation Planning Program
- PIFACC – Pacific Islands Framework for Action on Climate Change
- PMC – Pacific Meteorological Council
- MLDBs – Multi-Lateral Development Banks
- M&E – Monitoring and Evaluation
- NMSs – National Meteorological Services NRM – Natural Resource Management
- PICs – Pacific Island Countries
- PICS Panel – Pacific Islands Climate Services Panel
- RoK-PI CLIPS – Republic of Korea Pacific Islands Climate Prediction Services Project
- SIDS – Small Island Developing States
- SPC – Secretariat of the Pacific Community
- SPCZ – South Pacific Convergence Zone
- SPREP – Secretariat of the Pacific Regional Environment Programme
- STI – Science, Technology and Innovation
- UNFCCC – United Nations Framework Convention on Climate Change
- USP – University of South Pacific
- VANGO – Vanuatu Association of NGOs
- VMGD – Vanuatu Meteorological and Geo-Hazards Department
- WMO – World Meteorological Organisation

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