

## REQUEST FOR TENDERS

File: AP\_3/28/2  
Date: 17<sup>th</sup> October 2019  
To: Interested Service providers  
Contact: 1. Mr Sunny Seuseu, A/ Project Manager, Climate Information Services for Resilient Development in Vanuatu Project  
2. Mr Salesa Nihmei, Meteorology and Climate Advisor  
Subject: **Request for tenders: Cost benefit analysis of equipment for weather and climate systems in Melanesia** (Fiji, Papua New Guinea – PNG, Solomon Islands and Vanuatu)

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### 1. Background

- 1.1 The Green Climate Fund (GCF) is supporting two projects aimed at improving the delivery of climate information services and enhancing early warning systems in the Pacific Small Island Developing States (SIDS):
- a. **The Climate Information Services for Resilient Development in Vanuatu** (known locally as Van-KIRAP – *Vanuatu Klaemet Infomesen blong Redy, Adapt mo Protekt*) aims to deliver climate information services to Vanuatu through: enhancing and filling gaps in meteorological services including new instruments to augment the observation network; technical skills training for VMGD staff; developing customized CIS tools and products for sectors and communities, and; establishing effective delivery and communication mechanisms to increase awareness, dissemination and uptake.
  - b. **Enhancing Early Warning Systems to build greater resilience to hydro and meteorological hazards in Pacific Small Island Developing States.** The project aims to sustainably enhance early warning systems in the Pacific SIDS contributing to building greater resilience to hydro-meteorological hazards in the region. The proposed scope of the hazards for which EWSs will be created or enhanced is severe weather – including tropical cyclones, floods and drought. The focus countries are Fiji, PNG, Solomon Islands and Vanuatu.
- 1.2 The Secretariat of the Pacific Regional Environment Programme (SPREP) is the Accredited Entity responsible for the implementation of the projects. SPREP is an intergovernmental organisation charged with promoting cooperation among Pacific islands countries and territories to protect and improve their environment and ensure sustainable development.
- 1.3 For more information see: [www.sprep.org](http://www.sprep.org).

## 2. Specifications: statement of requirement

- 2.1. SPREP is calling for tenders from qualified and experienced consultants who can offer their services to assist SPREP and the Member countries (Fiji, PNG, Solomon Islands and Vanuatu) in undertaking a cost benefit analysis on the rationale and business case for the procurement, installation and life-of-equipment operations and maintenance of equipment for weather and climate systems which fulfil the functions outlined in the attached Terms of Reference (Annex A).
- 2.2. The Consultant will be engaged on a home-based, short-term contract. Travel to Fiji, PNG, Solomon Islands and Vanuatu to meet the respective Meteorology Services personnel to undertake the tasks as per Terms of Reference (Annex A) may be required.
- 2.3. The Terms of Reference and the specific duties /tasks for the Consultant are set out in Annex A.

## 3. Conditions: information for applicants

3.1 To be considered for this tender, interested Consultants must meet the following conditions:

- Submit a CV detailing previous relevant experience.
- Provide examples of relevant experience in undertaking cost-benefit analysis of weather and climate equipment and systems or similar fields.
- Provide at least three referees as part of their tender application.
- Complete the **tender application form** – *(please note you are required to complete in full all areas requested in the Form, particularly the Statements to demonstrate you meet the selection criteria – DO NOT refer us to your CV or your Technical Proposal. Failure to do this will mean your application will **not** be considered).*

## Submission guidelines

- 3.1. Tender documentation should demonstrate that the interested consultant satisfies the conditions stated above and is capable of meeting the required services and timeframes. Documentation must also include supporting examples to address the evaluation criteria.
- 3.2. Tender documentation should outline the interested consultant's complete proposal and include:
  - a. A **Technical Proposal** which contains the details to achieve the tasks outlined in the Terms of Reference (Annex A).
  - b. A Financial Proposal which is to be priced based on a work plan on how the technical assistance will be conducted and the length of time to be taken.
- 3.3. Tender submission must be in United States Dollars (USD).
- 3.4. The proposal must remain valid for 90 days from date of submission.
- 3.5. Tenderers / bidders must insist on acknowledgement of receipt of tender / proposals / bids.

## 4. Tender Clarification

- 4.1. Any clarification questions from applicants must be submitted by email to Alvin Sen on [alvins@sprep.org](mailto:alvins@sprep.org) and copy Salesa Nihmei on [salesan@sprep.org](mailto:salesan@sprep.org) and Rupeni Mario on [rupenim@sprep.org](mailto:rupenim@sprep.org) before 31 October 2019 and responses will be posted on the SPREP website [www.sprep.org/tender](http://www.sprep.org/tender) by 4 November 2019.
- 4.2. SPREP will select a preferred service provider on the basis of SPREP's evaluation of the extent to which the documentation demonstrates that the tenderer offers the best value for money, and that the tenderer satisfies the following criteria:

## 5. Evaluation criteria

- 5.1. SPREP will select a preferred Consultant on the basis of SPREP's evaluation of the extent to which the documentation demonstrates that the tenderer offers the best value for money, and that the tenderer satisfies the following criteria:
  - Proven track record in undertaking cost-benefit analyses for weather radar systems or similar environment;
  - Proven track record in undertaking cost-benefit analyses of all other equipment for weather and climate services and systems;
  - Strong knowledge of the observational networks and requirements in the Pacific region;
  - Qualifications in either economics, finance, science, geoscience, and/or social sciences and minimum of five years' experience in undertaking cost-benefit analyses in similar environments;
  - Demonstrated background in the field of meteorology;
  - Detailed financial proposal.
- 5.2. Assessment of proposals will be based on the evaluation of the Technical Proposal (80%) and Financial Proposal (20%).

## 6. Deadline

- 6.1. The due date for submission of the tender is: Friday, 8 November 2019, midnight (Apia, Samoa local time).
- 6.2. Late submissions will be returned unopened to the sender.
- 6.3. Please send all tenders clearly marked 'TENDER: Cost benefit analysis of weather and climate equipment and systems in Melanesia' to one of the following methods:

Mail: SPREP  
Attention: Procurement Officer  
PO Box 240  
Apia, SAMOA

Email: [tenders@sprep.org](mailto:tenders@sprep.org)  
Fax: +685 20231

Person: Submit by hand in the tenders box at SPREP Reception,  
Vailima, Samoa.

SPREP reserves the right to reject any or all tenders and the lowest or any tender will not necessarily be accepted.

**For any complaints regarding the Secretariat's tenders please refer to the Complaints section on the SPREP website**  
<http://www.sprep.org/accountability/complaints>

# **Annex A: Terms of Reference**

## **Cost Benefit Analysis of Equipment for Weather and Climate Services and Systems for Fiji, Papua New Guinea, Solomon Islands and Vanuatu**

### **A. Background**

#### **a. Climate Information Services for Resilient Development in Vanuatu**

The Climate Information Services for Resilient Development in Vanuatu (known locally as Van-KIRAP – *Vanuatu Klaemet Infomesen blong Redy, Adapt mo Protekt*) aims to enhance and fill gaps in meteorological services, including new instruments to augment the observation network, technical skills training for VMGD staff, developing customized CIS tools and products for sectors and communities, and establishing effective delivery and communication mechanisms to increase awareness, dissemination and uptake.

The Project is funded by the Green Climate Fund (GCF) with SPREP as the Accredited Entity. SPREP is the regional organisation established by the Governments and Administrations of the Pacific charged with protecting and managing the environment and natural resources of the Pacific. The head office is based in Apia, Samoa with about 100 staff.

#### *Vanuatu Meteorology and Geohazards Department and current weather radar capacity*

The Vanuatu Meteorology and Geohazards Department (VMGD) provides meteorological services and supporting research in weather related activities to Vanuatu sectors and communities. VMGD is responsible for operating and maintaining its meteorological instrument network and data systems to provide fast and high-quality weather data. It requires modern, up-to-date equipment and instrumentation that is appropriate to its needs.

Through the Van KIRAP project, the Green Climate Fund (GCF) is supporting the procurement of meteorological equipment. A major equipment item under the Project will be the procurement, installation and maintenance of a weather radar system to support the provision of real-time, high resolution visualized weather data.

Weather radar is a critical component of observational networks and associated weather forecast and warning systems for national meteorological departments around the world. This technology provides real-time, high resolution visualized weather data on forecast scales of hours to days at various spatial scales (from sub-regional to national/subnational) depending on technical design and operational specifications. Such data are critical to informing reliable and accurate Climate Early Warning Systems (CLEWS).

Current VMGD weather and climate infrastructure is not considered adequate to provide national coverage of real-time, high resolution data to inform CLEWS during severe weather events, such as tropical depressions/cyclones resulting in extreme wind and rain and associated extreme sea level events (storm surge and coastal inundation). Vanuatu was struck by three tropical cyclones in 2016 (Government of Vanuatu 2017). Areas were flooded but residents were not warned due to a lack of real-time rainfall intensity sensors available to enable VMGD forecasters to forewarn the population of the amount and intensity of precipitation expected.

Existing weather radar capability for Vanuatu is limited to coverage in the southern part of the island chain from a radar installation operated in New Caledonia. However, this system is

insufficient to meet existing and emerging needs for informing multi-hazards CLEWS across Vanuatu.

A weather radar on Efate (covering central Vanuatu) will enable VMGD to provide more accurate weather monitoring and forecasts that will have greater potential to reduce the loss of life and property associated with extreme weather events, including tropical cyclones. Radar will also enable the tracking of local extreme events (e.g. afternoon convection and hailstorms) which are not detectable or predictable at present. Radar will allow for better determination of rainfall rate/intensity which is important for determining the potential for flash flooding and landslides.

Improved tropical cyclone tracking is also possible in central Vanuatu with radar. This is important as more than half of Vanuatu's population live in the central islands. Better forecasts lead to greater public confidence in VMGD services. Conversely, radar will also help reduce the number of incorrect weather forecasts.

In a future warmer climate, tropical cyclones are predicted to become more intense in terms of wind speed and rain intensity. A radar on Efate has the potential to reduce the number of lives lost by providing more detailed and accurate forecasts of extreme rainfall and flash flooding associated with tropical cyclones and storms.

The procurement and installation of a radar will also enable VMGD to develop mesoscale forecasting which is currently not possible with the manual observation network. Additionally, the radar can be used to detect the extent of volcanic ash clouds and direction of movement of the ash cloud.

## **b. Enhancing Early Warning Systems to build greater resilience to hydro and meteorological hazards in Pacific Small Island Developing States (SIDS)**

The Project aims to markedly and sustainably enhance Early Warning Systems (EWSs) in the Pacific SIDS to an unprecedented level, thereby contributing to building greater resilience to hydro-meteorological hazards in the region. The proposed scope of the hazards for which EWSs will be created or enhanced is severe weather – including tropical cyclones, floods, and drought. The warnings will be issued and acted upon hours, days, weeks and - in the case of drought - months ahead of the hazard occurring.

The Project is currently in the project preparation phase through the Green Climate Fund (GCF) with SPREP as the Accredited Entity.

The Project will focus on a small group of Pacific SIDS in order to deliver sustained results in an efficient manner and at scale. The initial focus countries are Fiji, Papua New Guinea, Solomon Islands and Vanuatu. This group of countries is highly vulnerable and includes the most populous Pacific SIDS.

A stocktake on the current landscape for EWSs in the Pacific region was undertaken. The stocktake highlighted capacity gaps in all components of EWSs including hazard identification, analysis, warning dissemination and community preparedness. Challenges exist for Disaster Risk Reduction (DRR) and Disaster Risk Management (DRM) stakeholders to work together within clear institutional mechanisms, as well as for greater coordination of the varied investments in EWSs. The stocktake also found that capacities vary significantly depending on the hazard and country. Additionally, NMHSs and NDMOs need support to develop, issue and communicate scientifically-sound warnings.

The EWS Project will support:

- a. The installation, operation and maintenance of existing and new observing and forecasting infrastructure and programmes for monitoring hydrological and meteorological hazards, including rapid and slow onset events.
- b. Improve and/or establish new and additional EWSs facilities and infrastructure.

## **B. Intended use and functions of equipment**

This Terms of Reference covers two elements on the intended use and functions of the required equipment:

### **I. Intended use of the weather radar system within Vanuatu**

The intended use of the weather radar system within Vanuatu will provide for:

- a. Improved and accurate weather monitoring and forecasts.
- b. Tracking of local extreme events (e.g. afternoon convection and hailstorms) which are not detectable or predictable at present.
- c. Improved determination of rainfall rate / intensity. This is important for determining the potential for extreme rainfall and flash flooding enabling hazard warnings to be issued more accurately and in more timely fashion with consequent of reduced loss of life and property from extreme events.
- d. Development of mesoscale forecasting which is currently not possible with manual observation networks.
- e. Detection of the extent of volcanic ash clouds and direction of movement of the ash cloud.
- f. Provision of additional information to enable VMGD to provide real-time data to a range of sectors including the marine (ship/vessel marine forecasts) and aviation sectors.

### **II. Intended use of equipment for weather and climate services within Fiji, Papua New Guinea, Solomon Islands and Vanuatu**

The intended use of the weather and climate equipment within Fiji, Papua New Guinea, Solomon Islands and Vanuatu will provide for:

- a. Improve the accuracy of weather and climate warnings issued to communities
- b. Enable the development of localised early warning systems for flash flooding
- c. Improved and accurate weather monitoring and forecasts.
- d. Tracking of local extreme events (e.g. afternoon convection and hailstorms) which are not detectable or predictable at present.
- e. Improved determination of rainfall rate /intensity. This is important for determining the potential for extreme rainfall and flash flooding enabling hazard warnings to be issued more accurately and in more timely fashion with consequent of reduced loss of life and property from extreme events.
- f. Development of mesoscale forecasting which is currently not possible with manual observation networks.
- g. Provision of additional information to enable Meteorological Services to provide real-time data to a range of sectors including the marine (ships /vessel marine forecasts) and aviation sectors.
- h. Development of storm surge modeling if they do not exist

## C. Objectives

This engagement seeks to develop a comprehensive cost-benefit analysis on equipment to be procured by the two projects including the rationale for equipment and building of a business case for the installation and 'life-of-equipment' operations and maintenance. The engagement is also seeking to gain insights into potential revenue streams to support the ongoing maintenance and upkeep of the equipment and systems.

## D. Scope

The scope is twofold as follows:

### 1. **Cost-benefit analysis on the weather radar system for the project *Climate Information Services for Resilient Development in Vanuatu***

SPREP requires an in-depth cost-benefit analysis report focusing upon:

- a. A comparison of Weather Radar systems currently available on the market (i.e. S-band, C-band and X-band etc) investigating capability as per the criteria outlined below. The system must be compatible with comparable systems operational in the Pacific region.

The proposed weather radar must meet minimum standards as per the World Meteorological Organization (WMO) standards (WMO 2008) or Australian Bureau of Meteorology (BOM) standards (Gillespie 2017). Weather radar standards and SOPs for VGMD use will need to be developed during the Van-KIRAP project. Ideally the same type of radar is in use elsewhere in the Pacific region. The contractor(s) will ideally have some experience in the Pacific region and meet minimum quality assurance standards and certification. At a minimum ISO9001:2008 certification should be attained.

The most appropriate fundamental radar technology should be selected to obtain best value in terms of data quality, operational reliability and maintainability. This must be considered in terms of appropriate siting for optimum detection coverage, availability of suitable supporting resources and infrastructure, and reliability of the technology in accordance with required performance criteria for the projected lifetime of the system.

Criteria for the weather radar which are critical to radar technology and radar system selection includes:

1. Range resolution
  2. Ability to penetrate multiple bands of precipitation
  3. Ability to discriminate between different types of precipitation
  4. Ability to reject spurious return signals and artefacts
  5. Operational reliability and availability
  6. System maintainability
  7. Flexibility to tailor system parameters via software (e.g. scans, filters and data products)
  8. Display and visualization capability
- b. A review of operational Weather Radar systems in the region e.g. Fiji, New Caledonia, Australia and New Zealand – to assess comparable systems and explore existing capacity of these systems to support Vanuatu's needs.



- c. An assessment of the technical, financial capacity of the Vanuatu Meteorology and Geohazard Department (VMGD) in the sustainability aspect of the Weather Radar system.
- d. A detailed report on proposed revenue streams that the Weather Radar system can contribute to. The revenue streams will be to support the maintenance and upkeep of the equipment and focus on a number of options available.

**2. Cost-benefit analysis on the equipment for the project *Enhancing Early Warning Systems to build greater resilience to hydro and meteorological hazards in Pacific Small Island Developing States (SIDS)***

SPREP requires an in-depth cost-benefit analysis report focusing upon:

**(i) Weather radar systems for Fiji and the Solomon Islands**

- a. A comparison of Weather Radar systems currently available on the market (i.e. S-band, C-band and X-band etc) investigating capability as per the criteria outlined below. The system must be compatible with comparable systems operational in the Pacific region.
- b. The proposed weather radar must meet minimum standards as per the World Meteorological Organization (WMO) standards (WMO 2008) or Australian Bureau of Meteorology (BOM) standards (Gillespie 2017). Weather radar standards and SOPs for Fiji and Solomon Islands use will need to be developed during this project. Ideally the same type of radar is in use elsewhere in the Pacific region. The contractor(s) will ideally have some experience in the Pacific region and meet minimum quality assurance standards and certification. At a minimum ISO9001:2008 certification should be attained.
- c. The most appropriate fundamental radar technology should be selected to obtain best value in terms of data quality, operational reliability and maintainability. This must be considered in terms of appropriate siting for optimum detection coverage, availability of suitable supporting resources and infrastructure, and reliability of the technology in accordance with required performance criteria for the projected lifetime of the system.
- d. Criteria for the weather radar which are critical to radar technology and radar system selection includes:
  - 1. Range resolution
  - 2. Ability to penetrate multiple bands of precipitation
  - 3. Ability to discriminate between different types of precipitation
  - 4. Ability to reject spurious return signals and artefacts
  - 5. Operational reliability and availability
  - 6. System maintainability
  - 7. Flexibility to tailor system parameters via software (e.g. scans, filters and data products)
  - 8. Display and visualization capability
- e. A review of operational Weather Radar systems in the region e.g. Fiji, New Caledonia, Australia and New Zealand – to assess comparable systems and explore existing capacity of these systems to support Vanuatu’s needs.

- f. An assessment of the technical, financial capacity of the Vanuatu Meteorology and Geohazard Department (VMGD) in the sustainability aspect of the Weather Radar system.
- g. A detailed report on proposed revenue streams that the Weather Radar system can contribute to. The revenue streams will be to support the maintenance and upkeep of the equipment and focus on a number of options available.

**(ii) Other equipment for weather and climate services within Fiji, Papua New Guinea, Solomon Islands and Vanuatu**

- a. The intended use of other weather and climate equipment (in addition to the weather radar but not limited to ocean buoys and AWS) within Fiji, Papua New Guinea, Solomon Islands and Vanuatu will provide for:
  - 1. Improve the accuracy of weather and climate warnings issued to communities
  - 2. Enable the development of localised early warning systems for flash flooding
  - 3. Improved and accurate weather monitoring and forecasts.
  - 4. Tracking of local extreme events (e.g. afternoon convection and hailstorms) which are not detectable or predictable at present.
  - 5. Improved determination of rainfall rate /intensity. This is important for determining the potential for extreme rainfall and flash flooding enabling hazard warnings to be issued more accurately and in more timely fashion with consequent of reduced loss of life and property from extreme events.
  - 6. Development of mesoscale forecasting which is currently not possible with manual observation networks.
  - 7. Provision of additional information to enable Meteorological Services to provide real-time data to a range of sectors including the marine (ships /vessel marine forecasts) and aviation sectors.
  - 8. Development of storm surge modeling if they do not exist
- b. The proposed equipment must meet minimum standards as per the World Meteorological Organization (WMO) standards or Australian Bureau of Meteorology (BOM) standards. Ideally the same type of weather and climate equipment is in use elsewhere in the Pacific region. The contractor(s) will ideally have some experience in the Pacific region and meet minimum applicable international quality assurance standards and certification.
- c. The most appropriate fundamental equipment technology should be selected to obtain best value in terms of data quality, operational reliability and maintainability. This must be considered in terms of appropriate siting for optimum detection coverage, availability of suitable supporting resources and infrastructure, and reliability of the technology in accordance with required performance criteria for the projected lifetime.
- d. An assessment of the technical, financial capacity of the National Meteorology and hydrological Services in Fiji, PNG and Solomon in the sustainability aspect of the equipment.
- e. A detailed report on proposed revenue streams that the equipment can contribute to. The revenue streams will be to support the maintenance and upkeep of the equipment and focus on a number of options available.

## **E. Deliverables**

The Consultant will be responsible for delivering the following outputs:

- 1. For the project *Climate Information Services for Resilient Development in Vanuatu***
  - (i) A final report including:
    - a. Addressing the business case for weather radar systems including the social and economic benefits of weather radars.
    - b. Provide a detailed comparison between weather radars and their capability of meeting the requirements of Vanuatu.
    - c. A detailed comparison between weather radars on procurement and installation costs.
    - d. A detailed comparison between weather radars on life-of-equipment maintenance, upkeep and operational costs.
    - e. Overall requirements, recommendations to assist in defining subsequent procurements and costs.
  - (ii) An assessment of the technical, financial capacity of the Vanuatu Meteorology and Geohazard Department (VMGD) in the sustainability aspect of the Weather Radar.
  - (iii) A report on potential revenue streams from the procurement and installation of the weather radar system.
  
- 2. Enhancing Early Warning Systems to build greater resilience to hydro and meteorological hazards in Pacific Small Island Developing States (SIDS)**

### **Weather radar systems for Fiji and the Solomon Islands**

- (i) A final report including:
  - a. Addressing the business case for weather radar systems including the social and economic benefits of weather radars.
  - b. Provide a detailed comparison between weather radars and their capability of meeting the requirements of Fiji and Solomon Islands.
  - c. A detailed comparison between weather radars on procurement and installation costs.
  - d. A detailed comparison between weather radars on life-of-equipment maintenance, upkeep and operational costs.
  - e. Overall requirements, recommendations to assist in defining subsequent procurements and costs.
- (ii) An assessment of the technical, financial capacity of the Fiji and Solomon Islands Meteorology Services in the sustainability aspect of the Weather Radar.
- (iii) A report on potential revenue streams from the procurement and installation of the weather radar system.

## **Other equipment for weather and climate services within Fiji, Papua New Guinea, Solomon Islands and Vanuatu**

- (i) A final report including:
  - a. Addressing the business case for equipment used in their respective early warning systems which will meet the functional requirements of the project, including the social and economic benefits of the equipment and systems.
  - b. Provides a detailed comparison between suitable weather and climate equipment and systems and their capability of meeting the requirements of this Project.
  - c. A detailed comparison between weather and climate equipment and systems on procurement and installation costs.
  - d. A detailed comparison between weather and climate equipment and systems on 'life-of-equipment' maintenance, upkeep and operational costs.
  - e. Overall requirements, recommendations to assist in defining subsequent procurements and costs.
- (ii) A report on potential revenue streams from the procurement and installation of the equipment and systems where appropriate.

### **e. Selection Criteria**

The consultant must demonstrate that they have the level of experience and ability to provide high quality services of a similar type to those sought under this Request for Tenders by providing information on qualifications, professional experience and references for professional ability. Satisfactory references demonstrating the successful delivery of two (2) contracts where work of a similar type to that required under this tender must be provided.

The selection criteria used to determine the successful consultant are outlined below. The criteria are not in any order or to be given equal weighting.

Criteria are as follows:

- i. Experience**
  - Curriculum vitae of consultant outlining previous experience
  - Proven track record with a minimum of five years' experience in undertaking cost-benefit analyses in similar environments
  - Qualifications in economics, finance, science, geoscience or social sciences
  - Demonstrated background in the field of meteorology
  - Strong knowledge of the Pacific observational networks
- ii. Proposed Project Methodology**
  - Detailing activities to be conducted over the term of the engagement, including detail on how each activity will be undertaken.

## **f. Other Information**

1. It is expected the consultant will need to spend time in the participating countries liaising directly with existing project staff to undertake the required information gathering, and analysis of requirements for this Terms of Reference.
2. All in-country arrangements and support from country counterparts will necessarily be initially arranged through SPREP and no direct contact should be made until official introductions are made. The successful consultant will be provided with any appropriate documents identified and saved by SPREP as part of the preparation for the activity.