



CREWS PROJECT FINAL REPORT

1. Project title	Strengthening Hydro-Meteorological and Early Warning Systems in the Pacific	2. Project reference CREWS/RProj/04/Pacific
3. Implementing Partners	World Meteorological Organization (WMO)	4. Operational Partners Fiji Meteorological Service/Regional Specialised Meteorological Center in Nadi (FMS/RSMC Nadi). Secretariat of the Pacific Regional Environment Programme (SPREP). The Pacific Community (SPC). MetService New Zealand. Hydrologic Research Center (HRC). Asia Disaster Preparedness Center (ADPC).
5. Project Timeframe	Jan 2017-Dec 2020	
6. Actual Project Duration/Timeframe (if no-cost extensions were approved)	Jan 2017-Dec 2022	
7. SC approved Project Budget (in USD)	USD 2,500,000	

8. Reporting focal point	Lina Sjaavik lsjaavik@wmo.int
9. Report Certified Accurate by (with signature):	Filipe Lúcio
10. Project overview	<p>Please include synergies, leveraging, key project deliverables and total funding in bullet points. (max 250 words)</p> <p>The CREWS Pacific SIDS Project was co-funded by the CREWS Initiative (USD 2,500,000) and Environment and Climate Change Canada (ECCC) through the project “Building Resilience to High-Impact Hydro-Meteorological Events through Strengthening MHEWS in Small Island Developing States (SIDS) and South East Asia” (USD 3,100,000) .</p> <p>The project focused on strengthening the Regional Specialised Meteorological Centre in Nadi (RSMC-Nadi), Fiji and the NMHSs that it serves in the following Pacific SIDS; Cook Islands, Fiji, Kiribati, Nauru, Niue, Tokelau and Tuvalu. Moreover, the project supports the Federated States of Micronesia (FSM), the Republic of Marshall Islands (RMI), Palau, Samoa, Solomon Islands, Tonga, and Vanuatu. The prioritization was based on regional outreach, and other projects under implementation in the region.</p> <p>The project has three main components based on the three outcomes:</p> <ol style="list-style-type: none"> 1. <u>Improved governance</u>: strengthened governance structures and mechanisms for regional centres and NMHSs targeted by the project are in place.

	<p>2. <u>Enhanced product development and accessibility</u>: enhanced regional and national facilities and capacities of regional centres and NMHSs targeted by the project to produce impact-based forecasts and risk-informed warnings of extreme and high impact hydro-meteorological events, accessing and using global and regional data, products and services.</p> <p>3. <u>Enhanced service delivery</u>: Regional centres and NMHSs targeted by the project better deliver impact based and risk informed hydro-meteorological data, products and services to MHEWS stakeholders for their decision support.</p> <p>SPC, SPREP and the MetService New Zealand implemented subcomponents of the project. The project linked closely with other regional initiatives including the Australian Government funded project Climate and Ocean Support Program in the Pacific (COSPPac) implemented through the Australia Bureau of Meteorology (BoM), the Government of Russia funded project “Disaster Resilience for Pacific Small Island Developing States” implemented by UNDP, the GEF funded “Tuvalu Coastal Adaptation Project” implemented by UNDP and SPC, and the German Development Bank funded (KfW) initiative “Recovery Support for Tropical Cyclone Pam” implemented by SPC.</p>
<p>11. Summary of outcomes</p>	<p>What project outcomes were achieved? What were not realized? Describe any unexpected outcomes.</p> <p>Due to the COVID-19 pandemic and its effects in delivering training and organizing capacity building activities in the Pacific, some of the expected activities in the period March 2020 to September 2022 were modified or adapted to be delivered online, such as the regional workshops to increase awareness of national MHEWSs and regional/global support mechanisms.</p> <p>Output 1: National Meteorological and Hydrological Services service delivery improved, including the development of long-term service delivery strategies and development plans</p> <p>Under this output, the project successfully delivered a series of regional products, including a regional assessment of public and private capacities, gaps and needs with respect to MHEWS governance, product generation and service delivery; and virtual workshop to increase awareness of national MHEWSs and regional/global support mechanisms.</p>

Furthermore, under this output, the CREWS Pacific SIDS project supported the delivery and development of national strategic plans for Meteorological and/or Hydrological Services in Fiji, Kiribati, Tuvalu, Tonga, Republic of the Marshall Islands, Federated States of Micronesia and Palau. Specific to Kiribati, RMI, FSM and Palau, a National Framework for Weather, Water, Climate and Ocean Services was also developed.

The CREWS Pacific SIDS project also delivered a new Meteorological Act for Kiribati and Tuvalu – a process that counted with multiple rounds of consultations at different levels of society through hybrid modes (virtual and face-to-face) consultations. Lastly, a major achievement under the CREWS Pacific SIDS was the development of the Tonga Hydrology Strategic Plan in 2020. As a result of this work, the Tonga Water Resources Act, that had been in draft for over 30 years, was revised Gazetted on 16 November 2020.

Unrealised activities and unexpected outcomes:

Due to national regulations, the development and revision of some meteorological bills had to be tailored. In the Solomon Islands, for example, national procedures do not allow external bodies to draft their legislations - this can only be done by the Solomon Islands Attorney Generals Chambers. Therefore, the WMO was instructed to only produce a Policy Framework Paper and Drafting Instructions for the Nationals to utilise when drafting the bill.

Output 2: Risk Information to guide early warning systems and climate and weather service developed and accessible

Under this output, the project successfully delivered a variety of national and regional products related to the enhanced service delivery of hydrometeorological products by NMHSs. One of these products was the implementation of a Flash Flood Guidance System for Fiji, which is now fully operational.

A key activity under this output was the implementation and operationalization of Coastal Inundation Forecasting in three sites in Tuvalu and Kiribati, led by SPC. As part of activities wave buoys were procured and installed in both countries to produce marine forecasting data for communities and key economic sectors, such as fisheries. Thanks to one of the wave buoys deployed as part of the CREWS Pacific SIDS project at the Tarawa Lagoon, Kiribati, allowed the Kiribati Meteorological Service (KMS) to successfully predict an inundation event during Q4 2021 caused by king tide, even while on testing mode. In Tuvalu, the buoy installed allowed the NMS in its warning messages during the Spring tides of July 2022.

A series of consultative meetings around the region also took place under this output. A total of 7 National Climate

Outlook Fora, in some countries more than once during project implementation, in Fiji, Tuvalu, Tonga, Solomon Islands, and Samoa, and 5 Pacific Islands Climate Outlook Fora were supported under the project. Furthermore, two national drought consultations were carried out under the project.

An online training module was developed and delivered to 10 Pacific SIDS on forecasting and warning services for the Severe Weather Forecasting Demonstration Project (SWFDP).

Unrealised activities and unexpected outcomes:

Output 3: Information and Communication Technology, including common alerting protocol, strengthened

Under this output, the project successfully delivered information technology-related products and training to Pacific SIDS NMHSs. Amongst the main outcomes under this output, it is worth mentioning the completion of four websites (Meteorological Services/Offices of Palau, RMI, Kiribati and Nauru), and the development of an e-learning platform to provide IT-related training to NMHSs in the region – both activities carried on through SPREP implementation. Still related to the e-learning platform, project funds also allowed for the procurement of Conferencing equipment to all 14 Meteorological Services, and the hiring of a consultant for the development of e-learning modules – activity which is still ongoing under CREWS Pacific SIDS 2.0.

A relevant outcome was the procurement and delivery of High-Performance Computers for the implementation of Numerical Weather Prediction models by RSMC/Nadi, which serves NMHSs in the region with their data and forecasting.

Another achievement under this output was the completion of a feasibility study for the set-up of an FM Radio network in Tokelau – an essential tool for the improvement of EW dissemination and communication for last mile and vulnerable communities in the small island state. This report was circulated to the UNDP Samoa Office and Met Service New Zealand for potential support and further discussions. This is a good indication of further partnerships that can be established from this initial work completed.

Jump-Start Workshops for the implementation of the Common Alerting Protocol (CAP) have taken place in Niue, Tuvalu, Fiji, Palau, Nauru and FSM.

And finally, in-country workshops on dissemination pathways and enhancement of communication were delivered in Fiji and Samoa.

Unrealised activities and unexpected outcomes:

An activity expected within this outcome was the procurement of servers and UPS to support the development and hosting of the websites could not be completed in time due to existing monetary thresholds for implementing partner procurement processes in WMO. SPREP will seek other funding sources to progress with this activity. Due to the COVID-19 pandemic, regional training on IT could not be carried on. Instead, WMO and SPREP developed an e-learning platform for the delivery of IT-related training to NMHSs IT staff.

Output 4: Preparedness and response plans with operational procedures that outline early warning dissemination processes developed and accessible

Under this output, the project delivered multiple capacity building, knowledge, and communication products and services – despite many challenges posed by COVID-19-related restrictions from 2020 onwards. A regional workshop to initiate Impact-based forecasting in the region was organized and attended by 70 participants from Pacific SIDS NMHSs and NDMOs. The target for national workshops, initially set at 4, was revised and only one national workshop took place, in the Solomon Islands in October 2020. This activity paved way to a nation-wide IBF training and implementation in the Solomon Islands under the CREWS Pacific SIDS 2.0 project, a pioneering activity in the region.

CBEWS activities in Palau, RMI were rolled out by SPREP and in Samoa by SPREP and the Samoa Red Cross Society, in some cases through partnership with local authorities. Activities in Samoa led by SPREP, for example, included the conclusion of first aid training in selected communities, installation of Billboards with warning messages for commuters, and the review of the Community Disaster & Climate Risk Management Programme for Samoa (with support from the NDMO). Activities led by the Samoa Red Cross Society, with the support from the Samoa Meteorology Division- Ministry of Natural Resources and Environment (SMD-MNRE), National Disaster Management Office (NDMO), aimed at strengthening Early Warning Early Action in the Vaa o Fonoti District Communities of the country, and more specifically along the Fagaloa bay. Activities included assessment of current risk and hazard status of 9 villages, establish EWEA plans based on each village profile, and conduct capacity training based on communities' needs and on Climate Change & EWEA, DDR Management, First Aid and promotion

of Water, Sanitation and Hygiene promotion.

The conclusion, printing and distribution of Traditional Knowledge Glossaries in Palau highlights the commitment of the CREWS Pacific SIDS project to embracing traditional knowledge in early warning services.

This was further complemented by the Climate Traditional Knowledge program of the Niue Meteorological Service, which was made available thanks to CREWS Pacific SIDS project funds, and its support to the national Girls and Boys Brigade. A key result of the program was the increased knowledge in the planting and cultivation of yam amongst women and children, which is considered locally as a climate indicator for cyclones – if the plant grows upwards, it means there is no cyclone coming, however if the plant grows outwards or becomes tangled, it is a sign to prepare for a storm. This is an example of climate traditional knowledge held by those living on the land, whether indigenous or non-indigenous peoples, which can be used for climate forecasting. This knowledge has continually evolved over time and is often imbedded in practice and belief.

Unrealised activities and unexpected outcomes:

As mentioned, the target for national IBF workshops was revised during project implementation. Due to the COVID-19 pandemic, this workshop in the Solomon Islands, was carried on virtually.

Furthermore, due to the pandemic, many CBEWS activities were either delayed or impossible to be carried out – mainly due to travel restrictions and inability to access communities in outer islands.

Output 5: Knowledge products and awareness programmes on early warnings developed

Under this output, the project delivered an information campaign on Tropical Cyclone Forecasting. The main product – a video titled 'Pacific Islands highlight importance of impact-based early warnings for tropical cyclones' is available on [YouTube](#). Moreover, a media package for TV and radio stations around the Pacific, meant to repeat the key messages in local languages has been made available: 1) [Vanuatu sample](#) ; 2) [Fiji sample](#)

Unrealised activities and unexpected outcomes:

The information campaign was aimed at the Asia-Pacific Ministerial Conference on Disaster Risk Reduction (APMCDRR) scheduled for 23-26 June 2020. However, due to COVID-19 the Conference was postponed and was

	<p>carried on in virtual format.</p> <p>Output 6: Gender-sensitive training, capacity building programmes provided</p> <p>Under this output, the project delivered training for female NMHS staff on leadership. Women in Leadership workshop took place in August 2019. 35 women, working in meteorology, hydrology and climatology from 13 Pacific Island States were trained in leadership. The workshop took place prior to the Fifth Pacific Meteorological Council Meeting in Samoa, in August. The 1.5-day workshop focused on leadership for women in meteorology and hydrology for Pacific Small Island States in WMO Regional Association V (South-West Pacific). The workshop built upon and strengthened participants' leadership skills, with a focus on communication, confidence, and shared strategies for positive change at the national and international level.</p> <p>CREWS Regional Output: Institutional and human capacities at Regional WMO and Intergovernmental organizations to provide regional climate and weather services to LDCs and SIDS increased</p> <p>Under this regional output, the project successfully delivered products and services tailored to the RSMC-Nadi, which serves the whole Pacific Region as a source of reliable and high-quality weather forecasting. Amongst the main outcomes under this output are the development of a long-term strategic plan for FMS/RSMC-Nadi , and the implementation of a high-resolution Numerical Weather Prediction mesoscale model in RSMC – this was possible thanks to the procurement and delivery of HPC computers to FMS under this project. Furthermore, licenses were provided to the RSMC-Nadi (ECCharts) throughout the project duration.</p> <p><u>Unrealised activities and unexpected outcomes:</u></p> <p>The upgrade of the FSM/RSMC-Nadi website, while planned under this project, was postponed and is expected to be delivered under the CREWS Pacific SIDS 2.0 project currently under implementation.</p>
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12. Lessons Learned

Kindly note important lessons learned from the project, including what were the factors that hindered or enabled successful project implementation and contributions to each of the CREWS value propositions (200 to 250 words).

The COVID-19 pandemic and its consequences to traveling in the region was amongst the main issues found during the life of the project. Nevertheless, thanks to the adoption of virtual/hybrid meeting modalities, it was possible to deliver meetings, community consultations, workshops and even strategic coordination meetings online – enabling therefore the successful implementation of the project despite challenges posed by the pandemic. This has enabled the project implementation to be **solution-oriented** and **people-centered** during a restrictive period for the region and for the world. Examples include the development of the National Strategic Plans and Frameworks for Weather, Climate and Ocean Services for the North Pacific (RMI, FSM and Palau), almost entirely carried online and/or hybrid mode. This allowed for a better utilization of project resources and reallocation of potential travel expenses into other activities.

The project has **promoted coherence** between existing initiatives being implemented in the Pacific Region, including the Australian Government funded project Climate and Ocean Support Program in the Pacific (COSPPac) implemented through the Australia Bureau of Meteorology (BoM), the Government of Russia funded project “Disaster Resilience for Pacific Small Island Developing States” implemented by UNDP, the GEF funded “Tuvalu Coastal Adaptation Project” implemented by UNDP and SPC, and the German Development Bank funded (KfW) initiative “Recovery Support for Tropical Cyclone Pam” implemented by SPC. In many instances, project activities contributed to other activities being delivered under the beforementioned projects, and allowed for a better integration and development of early warning preparedness and solutions to the countries involved.

Thanks to the **unique** presence of the WMO Subregional Office for the South-West Pacific Region, project coordination with Members has proved to be a valuable asset to ensure accountability by NMHSs and trust between them and WMO.

13. Stakeholders

Organisations (private/public/governmental) involved and their main contribution to the project:

Fiji Meteorological Service/Regional Specialised Meteorological Center in Nadi (FMS/RSMC Nadi).



FMS/RSMC Nadi was a main beneficiary of project funds. Concrete activities included capacity building, enhancement of service delivery capacity to Pacific SIDS NMHSs and procurement of high-end technological solutions.

Secretariat of the Pacific Regional Environment Programme (SPREP).

SPREP was one of the project main implementing partners carrying on CBEWS activities, notably in Samoa, Palau and RMI, and ICT-related activities.

The Pacific Community (SPC).

SPC was a key project implementing partner delivering coastal inundation forecasting to Tuvalu and Kiribati.

MetService New Zealand.

Hydrologic Research Center (HRC).

HRC developed the Fiji Flash Flood Guidance System (Fiji FFGS) and responsible for conducting training for the forecasters of Fiji Meteorological Services (FMS).

Asia Disaster Preparedness Center (ADPC).

ADPC was involved in the assessment of MHEWS,

Samoa Red Cross Society

SRCS was an implementing partner responsible for the delivery of CBEWS activities in Samoa, notably an assessment of current risk and hazard status of 9 villages in the country, establish EWEA plans based on each village profile, and conduct capacity training based on communities' needs and on Climate Change & EWEA, DDR Management, First Aid and promotion of Water, Sanitation and Hygiene promotion.

Kordia Ltd.

Kordia Ltd is a private company responsible for the delivery of the Tokelau Radio Feasibility Study.



E-Mentor

E-Mentor is a private company procured to develop an E-learning platform for SPREP, meant to be used for the virtual training of ICT staff from Pacific NMHSs.

Individuals involved and their main contribution to the project:

Edward Young

Edward Young was a consultant responsible for the drafting and delivery of the NSP and NS-FWCOS for Palau, RMI and FSM.

Geoffrey Love

Geoffrey Love was a consultant responsible for the drafting and delivery of the NSP and its Action Plan for Fiji.

Bapon Fakhruddin

Bapon Fakhruddin was a consultant responsible for the drafting and delivery of the NSP for Kiribati.

Andrea Volentras

Andrea Volentras was a consultant responsible for the drafting and delivery of the Kiribati Meteorological Bill

Graham Powell

Graham Powell was a consultant responsible for the drafting and delivery of instructions for the development of the Solomon Islands Meteorological Bill

Steve Menzies

Steve Menzies was a media consultant responsible for the production of communication products for the project (videos, online features, media packages).

Ian White and Tony Falkland

Ian White and Tony Falkland delivered the Tonga National Hydrology Strategic Plan and revised and ensured the passing of the Tonga Water Resources Act (2020)

Bikenibeu Paeniu

Bikenibeu Paeniu developed the Tuvalu Meteorological Service Strategic Plan 2019-2024

Filiga Taukiei

Filiga Taukiei developed the Meteorology Bill for Tuvalu

George Carter

George Carter developed e-learning modules for SPREP, used in the training of ICT staff from

14. Visibility products

a. Insert or copy any links to press releases, videos or communication items and/or social media links

[Pacific Meteorological Council celebrates ten years of service](#)

[Kiribati Framework for Weather, Climate and Ocean Services | World Meteorological Organization \(wmo.int\)](#)

'Pacific Islands highlight importance of impact-based early warnings for tropical cyclones' is available on [YouTube](#).

Media package for TV and radio stations around the Pacific, meant to repeat the key messages in local languages has been made available: 1) [Vanuatu sample](#) ; 2) [Fiji sample](#)

[It is time to revolutionise how we talk about the weather – Al Jazeera](#)

[Samoa Red Cross Society – CBEWS Pre-Consultation](#)



[Samoa Red Cross Society – CBEWS Final Project video](#)

[Incorporating Traditional Knowledge In Tropical Cyclone Monitoring For A Resilient Niue](#)

Coastal Inundation and Ocean Buoy Awareness videos produced during the project implementation period:

[Coastal Inundation Awareness video – Bislama \(Vanuatu\)](#)

[Ocean Buoy Awareness video – Bislama \(Vanuatu\)](#)

[Coastal Inundation Awareness video – Tuvaluan \(Tuvalu\)](#)

[Ocean Buoy Awareness video – Tuvaluan \(Tuvalu\)](#)

[Coastal Inundation Awareness video – Pijin \(Solomon Islands\)](#)

[Ocean Buoy Awareness video – Pijin \(Solomon Islands\)](#)

[Coastal Inundation Awareness video – Samoan \(Samoa\)](#)

[Ocean Buoy Awareness video – Samoan \(Samoa\)](#)

[Coastal Inundation Awareness video – Nauruan \(Nauru\)](#)

[Ocean Buoy Awareness video – Nauruan \(Nauru\)](#)

[Coastal Inundation Awareness video – Micronesian Chuukese \(FSM\)](#)

[Ocean Buoy Awareness video – Micronesian Chuukese \(FSM\)](#)

15. Supporting documents

- a. *List and annex to the report any documents providing details on project activities such as review reports, reports of training sessions, technical assessment reports, online solutions and tools, manuals, summaries of high-level discussions etc.*

1. *PICOF-6 Report*
2. *PICOF-7 Report*
3. *Palau CBEWS Progress Report*
4. *Niue CBEWS Progress Report*
5. *SPC Q3 2020 Progress Report*
6. *SPC Q4 2020 Progress Report*
7. *SPC Q1 2021 Progress Report*
8. *SPC Q2 2021 Progress Report*
9. *SPC Q3 2021 Progress Report*
10. *SPC Q4 2021 Progress Report*
11. *SPC Q1 2022 Progress Report*