

Sustainability of measurements post donor funded programmes

Andrew Harper, Graham Elley, Alan Porteous
National Institute of Water and Atmospheric Research Ltd.(NIWA), 10 Kyle Street, Riccarton,
Christchurch, NEW ZEALAND

+64 3 3488987, andrew.harper@niwa.co.nz

Abstract

It has been long recognised that for many regions of the world, donor funded (aid) projects are essential for the continued development of essential meteorological, climatological and hydrological monitoring networks, and organisational capability.

The WMO International Conference on AWS (ICAWS-2017) highlighted that many of the operational monitoring issues encountered in the Pacific region, particularly following the completion of donor projects, are common global problems.

This paper shares some RA V experiences since ICAWS-2017 with the provision of sustainable measurements, through working with donor programme technical specialists, especially in the provision of ongoing support and training.

INTRODUCTION

Due to relatively low populations and GDP there are significant demands and constraints on Government resources and funding, in many Pacific Island Countries and Territories. Because of this, many National Meteorological and Hydrological Services (NMHS) are heavily reliant on ongoing access to international aid and investment projects to support many existing and new initiatives, and to maintain the infrastructure and services that have been put in place through previous projects. *Challenges and strategies for climate monitoring in the Pacific [Harper, 2016]*

Many recent projects have been developed based on Disaster Risk Reduction (DRR) and Climate Change (CCM) mitigation principles and the need for access to reliable climate services data and information. While the physical observations component, such as instrument installations and network development, have been funded as a priority within new project investments, provision for the maintenance and ongoing operational costs within the wider planned outcomes has been considered less important, or even overlooked entirely. In some cases, the recipient countries have found themselves confronted with unexpected operational costs that may not have been fully recognised during the project design phase.

Weather and climate have a major impact on the day to day lives and wellbeing of all people living in Pacific Island countries. Understanding the status and role of drivers of systems such as the South Pacific Convergence Zone and larger scale climate oscillations such as the El Nino-Southern Oscillation, through the provision and analysis of multiple surface and upper air observations, is highly important.

While the focus of many programmes is on increasing community and economic resilience to present and future climate risks, the introduction of new technologies required to implement weather, climate and hydrometric monitoring, electronic communication and data management systems enables the NMHSs to meet or contribute to wider range of public good outcomes, including most of the Pacific Key Outcomes identified in regional policy documents such as the Pacific Islands Meteorological Strategy (PIMS) 2012-2021 and further revised in PIMS 2017-2026.

These wider benefits make the implementation of support and maintenance for these systems even more important.

Example PKO's that directly or indirectly benefit from environmental monitoring and resilience programmes are:

- ✓ Improved aviation weather services
- ✓ Improved marine weather services and establishment of ocean services
- ✓ Improved public weather services
- ✓ Strengthened NMHSs capacity to implement Multi-Hazard Early Warning Systems (MHEWS) for tropical cyclones, coastal inundation and tsunamis
- ✓ NHMSs contribution to climate change activities
- ✓ Improved climate information and prediction services through the implementation of the Pacific Roadmap for Strengthened Climate Services
- ✓ Strengthen collaboration between meteorological and hydrological services to better manage water resources and reduce the impact of water related hazards
- ✓ Integrated observing and communication systems
- ✓ NMHSs institutional strengthening and capacity development
- ✓ Support to NHMSs is coordinated
- ✓ PMC is an efficient and effective body

NMHSs in the RA V region vary in size from less than 10 staff to more than 100 staff. As such, there are major disparities between the NMHSs and their ability to sustain observation programmes, especially once the initial aid-driven programmes cease. This might be through inadequate access to training and operational consumables, limited resourcing of basic maintenance programmes, or simply lack of staff. The operational reality is many NMHS still require continued access to donor funding to reliably support on-going operational services.

The WMO International Conference on AWS (ICAWS-2017) highlighted that many issues encountered in the Pacific region are common globally occurring issues. *IOM Report, 127. WMO International Conference on Automatic Weather Stations (ICAWS-2017).*

Some of key messages towards sustainability have been the need for:

- Consistency – in the design and operational methods of systems nationally and regionally
- Long-term sustainability – adequate financial resourcing and capacity building of staff and NMHS
- Preventive maintenance of networks must be a priority
- The development of measurable competencies – observations, instruments, calibration and network management
- Training – needs to be available at all stages, targeted and regularly reinforced
- Technical agencies and regional partners need to coordinate and sustain their collaborative engagement, to continue to improve the sustainability and resilience of the wider Pacific monitoring communities

SUPPORT INITIATIVES

Regional initiatives have been developing in the Pacific region to address issues of sustainability highlighted in the above key messages.

Operational competencies training

The first has been the development of a Climate and Hydrological Network and Operational Competencies Training Workbook. The workbook has been developed to supplement the activities

of several donor programmes and in consultation with National Meteorological and Hydrological Services (NMHS) across the region.

During the discussion session “Benefits and Challenges of Transitioning to Automated Observations”, at TECO-2016 it became clear that many delegates were unaware of much of the guidance material produced by WMO, or where to find it. The Workbook brings together many reference documents and draws on WMO guidance material in a systematic way to provide task-based competencies training, with particular focus on operational skills that are required to manage Pacific climate information and early warning systems.

The Workbook contains six modules from Strategic and Technical Overview (or Network Management) through to Sector Engagement, continues to evolve as work continues with various NMHSs, and can be a useful foundation experience for technical staff who may wish to pursue qualifications under the WMO BIP-MT programme.

Training Scholarships

Secondly, where previously many programmes focused on providing hardware and data collection infrastructure, there has been a noticeable shift, in particular over this past year, in recognizing the challenges faced by NMHS to sustain the quality of observations operationally and the need for relevant training.

Regionally the New Zealand Ministry of Foreign Affairs and Trade (MFAT) Short Term Training Scholarships (STTS) and the UNDP administered Disaster Resilience in the Pacific Small Island States (RESPAC) projects, are two such initiatives that are focusing on these activities.

The New Zealand Short Term Training Scholarships (STTS), allow for short term placements from qualifying Pacific and Asian countries with various technical or educational agencies in New Zealand.

RESPAC regional support programme

RESPAC (Disaster Resilience in the Pacific Small Island States) is a partnership with the Russian Federation, UNDP Pacific Office in Fiji, and Pacific Island Governments, to coordinate and provide support and technical assistance within the Pacific. Funding is managed by the UNDP Pacific Office.

The RESPAC projects have been a major driver in the change to growing organisational capability and has been a primary contributor in providing and coordinating support and technical assistance training to NMHSs to strengthen their ability to manage, operate and maintain their climate and other observation programmes.

Other regional programmes

Regionally there have been several other programmes and initiatives such as the Australian Climate and Oceans Support Program in the Pacific (COSPPac), the Japan International Cooperation Agency (JICA), and the Finnish Pacific project (FINPAC), all of which have contributed to increasing the operational capability of NMHSs.

In-country initiatives

The following are four examples of a shifting focus from infrastructure to technical competencies and capacity growth.

VANUATU

The Republic of Vanuatu is an archipelago consisting of 82 relatively small islands of volcanic origin with about 1300km between the northern and southern most islands. The surface land area is only

4700 square kilometres out of a total area of 12274 square kilometres. Most of the islands are steep with unstable soil and limited water. There are several active volcanoes and relatively frequent earthquakes. Vanuatu is also subject to Category 5 Tropical Cyclones.

The NMS in Vanuatu is the Vanuatu Meteorology and Geohazards Department (VMGD) is a department within the Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Energy, Environment and Disaster Management.

The installation of 6 AWS in Vanuatu was funded through the UNDP supported, GEF-DCF funded project Vanuatu Coastal Adaptation Project (VCAP). A further 3 AWS were funded by GIZ and 2 more by JICA. The AWS network is scattered and very remote with most of them at collocated, or near to, existing manual observing outposts.

Since installation, the ongoing operation of the monitoring network has become the responsibility of VMGD's ICT and Engineering Division. VMGD have successfully been able to operate and maintain their network from within their operating budgets, for both routine and non-routine work.

VMGD have developed a well organised maintenance programme and have been able make additional site visits, such as those required after recent volcanic eruptions to clear away ash deposits from the AWS. Travelling to these remote sites is not a trivial process and is expensive.

To assist with "first-line" maintenance and troubleshooting at these remote locations, VMGD have implemented a training programme for all observing outpost staff. This training has been funded by both the original VCAP project and from VMGD operating budgets.

PAPUA NEW GUINEA

Papua New Guinea is located north of Australia, consisting of the eastern half of the island of New Guinea and several off-shore islands. It is one of the most culturally diverse countries in the world and has one of the most rural populations with only 18% of the more than 8 million people living in urban centres. PNG covers 462,840 square kilometres and is extremely rugged in places and mostly covered in tropical rainforest. Volcanic eruptions are frequent, earthquakes relatively common and sometimes accompanied by tsunamis. The climate is significantly influenced by the monsoon circulation.

The National Weather Service (NWS) of Papua New Guinea has recently installed a network of 5 AWS along with a network of hydrological stations for the PNG Conservation and Environmental Protection Authority (CEPA) the country's hydrometric service. These were implemented by UNDP as a component of a project called 'Enhancing Adaptive Capacity of Communities to Climate Change-related Floods in the North Coast and Islands Region of PNG', which was financed by the GEF Adaptation Fund.

It was recognized early on in the project that to enable sustainable network operations further training was required and NIWA worked with UNDP and NZ MFAT to develop a Short Term Training Scholarships (STTS) programme of training placements in New Zealand for four NWS staff.

The four areas of focus were based upon the structure defined in the training workbook: Network Management, Climate Services, IT and Instrumentation and one person from each of these groups within NWS attended the training. Where there was overlap, training was held as groups, otherwise training was targeted to the activities of the individual.

For example, the network management training involved 6 assignments with an expected outcome of “Demonstration of knowledge transferred via the development of a draft management plan associated with instrument operations, maintenance and budget”, which can be refined/incorporated into annual workplans upon return to PNG by:

1. Documenting the current operational status of PNG NWS network.
2. Prepare an annual operational budget for their 6 AWS.
3. Complete a desktop scoping exercise for the definition of locations for 6 further AWS.
4. Collate metadata of 6 AWS for input into OSCAR metadata management tool.
5. Create a draft AWS site maintenance recording form.
6. Compile a list of operational spares and consumables required for management of the AWS.

An aim of this programme was to encourage participants to think about the different components of the NWS network as a whole, rather than, for example, just a climate or aviation station in isolation, and to consider the ongoing operational budget and whole life cycle of an AWS within their network.

FIJI

Fiji has more than 300 islands and covers an area of more 194,000 square kilometres of which only 10% is land. The two major islands of Viti Levu and Vanua Levu are well developed and are home to 87% of the population. Fiji is subject to regular hazards including drought, flooding and tropical cyclones.

Fiji has operated a large network of AWS and hydrometric stations for many years. These networks continue to expand to fill information gaps.

There has been significant growth in staff and organisational capability over recent years. An example is the development of an instrument calibration facility, provided through the Japan International Cooperation Agency (JICA) and the related training provided by the Japan Meteorological Agency (JMA) at Tsukuba.

Fiji was the first of the UNDP/RESPAC training projects that NIWA was involved in. RESPAC staff in consultation with FMS quality management staff developed a scope of work to provide training aimed primarily at enabling FMS technical staff to maintain and restore all FMS AWS to a fully operational status. Some of the more current issues in the FMS network were in part due to damage from recent cyclones, the turnover of trained technical staff and the ongoing challenges of getting to some of the more remote monitoring locations.

The programme covered a two week period and was based around the structure of the training Workbook, focusing on the Instruments and Troubleshooting topic areas. The first three days were classroom and technical workshop-based with the remaining time spent with technicians in the field, reviewing stations and making the AWS operational. The technical staff were split into two teams and over 12 AWS were visited, with some involving chartering of aircraft including a sea-plane.

COOK ISLANDS

The Cook Islands comprise of 15 islands whose total land area is only 237 square kilometres but spread over 2,200,000 square kilometres with over 1400 kilometres between the southern-most island and the northern-most. The islands are volcanic in origin with the northern group consisting of 6 low lying atolls. The area of island ranges from less than 1 square kilometre to 67 square kilometres. Total population is around 17,500. The climate is tropical oceanic. Tropical cyclones, drought, storm surge and tsunami are the main hazards.

A perceived benefit of several recent donor projects across several different PICTs has been a common approach and related consistency of instruments and operational methods. This has given each country the ability to increase cooperate and to learn off from each other the various aspects of providing reliable observations and products.

Whilst not limited to the Cook Islands, they are an excellent example of the increasing technical cooperation across the region. For example, various Cook Islands activities have been supported by NIWA, (training, AWS and climate services development) and MetService from New Zealand (training, AWS and transmission of coded messages), the Bureau of Meteorology in Australia (training, and database development) and more recently Cook Islands AWS installations have included service and calibration training opportunities for technical staff from other PICTs, which has been supported and funded by the UNDP/RESPAC partnership.

A message that often gets lost or overlooked by both donors and recipients, is adequate resourcing of spares or network operational consumables. Often all that is required are simple spare components such as bearings or cables, charts for recording instruments or even a dipstick for an evaporation pan, rather than complete instruments or systems. These sound like simple requirements, but the lack of spares is commonly the sole reason why data are not available.

An example from the Cook Islands is the cessation of their long-term Upper Air programme. Oceania has long been recognized as being data sparse. This isn't always because they don't have the technical facilities, it is more typically because of reduced funding for consumables. In the Cook Islands example, they have a fully functional upper air system balloon system and were meeting all targets for balloon burst heights and reporting but lost the external funding for balloons and radiosondes and the programme has stopped.

CONCLUSION

Due to low populations and GDP, and vast distances across open sea between islands, most Pacific Island NMHSs continue to be reliant on external aid to complement or fully fund surface and upper air observation programmes. While some NMHSs will always struggle due to their size and location, there has been good capacity growth across the region in recent years.

Training focused programmes such as the NZ MFAT Short Term Training Scholarships and the UNDP/RESPAC partnership are key to maintaining growth in capability and sustainability in individual NMHSs across the Pacific region.

Regional cooperation and coordination of regional and international projects and support agencies is crucial for the future success and sustainability of observations within the region.