SPREP

South Pacific Regional Environment Programme

Report of the Fifth SPREP Meeting of Regional Meteorological Service Directors (RMSD)

Honolulu, Hawaii
11–13 November 1998

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SPREP's Climate Change and Integrated Coastal Management Programme

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Contents

Meeting executive summary and recommendations

Having met in Honolulu, Hawaii, from 11 to 13 November 1998, participants of the Fifth SPREP Meeting of Regional Meteorological Service Directors (RMSD) have agreed on the following specific summary and recommendations which are directed towards government decision-makers and relevant organisations.

In 1993, the SPREP Secretariat organised the First SPREP Meeting of Regional Meteorological Service Directors in Port Vila, Vanuatu. The SPREP RMSD originated from a recommendation contained in the report 'Changing Climate in Paradise' prepared by the Bureau of Meteorology of Australia for the World Meteorological Organization (WMO) in 1991. The aim of the meeting is to provide a forum for Directors of Meteorological Services from SPREP member countries to share and exchange views on their climate activities and to promote the development of regional initiatives to assist members in the formulation and implementation of cooperation programmes.

The following recommendations were generated and adopted:

1. Participants of the Fifth SPREP Meeting of Regional Meteorological Service Directors received with appreciation the report by the SPREP Secretariat regarding follow up actions to implement recommendations of the Fourth SPREP Meeting of Regional Meteorological Service Directors. Participants noted that the Secretariat had addressed many of the recommendations from the past meeting and had made good progress towards addressing the other matters still outstanding. The meeting requested that the SPREP Secretariat continue its efforts in implementing those outstanding matters.

2. The meeting recognised the importance to the region of providing an integrated programme of forecast and information services which addresses the continuum from weather to climate and including issues related to hydrology and water. The participants noted the critical role that SPREP is playing in supplementing WMO and national efforts in the area of weather and climate and encouraged SPREP to continue to provide a forum for National Meteorological Services (NMS) in Pacific island countries (PICs) to: identify critical issues; promote collaboration in the development of shared solutions to common problems; enhance awareness of weather and climate issues and programmes at appropriate levels of government in the region such as the ministerial level; and identify opportunities to improve regional capacity to forecast, understand and address the impacts of weather and climate. Specifically, the meeting participants unanimously agreed that the SPREP Secretariat should broaden its scope of work to cover meteorology and climate matters in addition to its climate change programmes. In this regard, the meeting urged SPREP to develop a long-term strategic plan for the Pacific region taking into account the WMO Fifth Long-Term Plan (5LTP) and the priority areas agreed to at the WMO Regional Association (RA) V meeting in Bali, Indonesia in September 1998. To address the needs of PICs related to weather and climate monitoring, forecasting, assessment and applications, the meeting urged the SPREP Secretariat to pursue appropriate mechanisms to establish a special purpose fund to supplement existing sources of support (from national governments, donor nations and WMO).

3. The meeting welcomed the convening of the Year 2000 Workshop held prior to the Fifth RMSD and thanked the sponsors of this workshop. Having examined the workshop report, the meeting adopted the report in full. The meeting took note of the offer by New Zealand to provide technical assistance to NMSs which rely on New Zealand's assistance. The meeting strongly recommended that SPREP and WMO, in collaboration with the US National Oceanic and Atmospheric Administration National Weather Service (NOAA NWS), Meteorological Service of New Zealand Ltd and other parties form a task team to assist NMSs of PICs to ensure that all meteorological equipment is fully compliant by December 1999.

4. The meeting noted with satisfaction the progress of national reports on meteorological/ climatological activities in each SPREP member country. Many valuable experiences and lessons were identified, including issues related to:

   (a) the importance of recognising the close links between the weather, climate and hydrological information responsibilities of the National Meteorological Service Directors in the region;

   (b) status reports on critical observational systems;

   (c) the benefits of critical new technologies such as the EMWIN and Qfax systems in supporting weather and climate forecasting for economic development and disaster management and highlighted the need for continued maintenance and training for these systems;

   (d) the challenges and opportunities of public education and outreach activities, including support for media outreach; and

   (e) the importance of regional and international cooperation and the value of meetings like this in facilitating this collaboration.

5. The meeting expressed its appreciation to WMO, SPREP, the European Union (EU), the United States, Australia, France and New Zealand for their invaluable contributions to support NMSs in the SPREP region.The meeting acknowledged with gratitude the ongoing support and leadership provided by the Fiji Meteorological Service to several PICs, especially in regard to supply of routine and Special Weather Bulletins.

6. The meeting noted with appreciation the rapid progress made in developing and implementing the Emergency Managers Weather Information Network (EMWIN) data transmission system throughout the PICs. The meeting expressed its thanks to the United States NOAA NWS for including the PICs. This has greatly assisted them in the rapid dissemination of warnings and other data to PICs. The meeting took note of the lack of EMWIN coverage at present for the far Western Pacific including parts of PNG, Guam, Federated States of Micronesia, Palau and the Northern Mariana Islands. The meeting was informed of the proposal to use Pan-Pacific Education and Communication Experiments by Satellite (PEACESAT) for reaching this area and urged SPREP to follow up this proposal with the US NOAA NWS in order to support the research, development and operational requirements associated with providing full coverage to the SPREP member countries and the South-East Asia region.

7. The meeting participants noted with great pleasure the announcement of the US Government's recognition of the importance of the EMWIN system through the awarding of a Department of Commerce Gold Medal to the EMWIN system designers Jim Doherty and Phil Weigant.

8. The participants acknowledged reports of continued contributions of the Pacific ENSO Applications Centre (PEAC), expressed gratitude to PEAC sponsors and noted the importance of a number of PEAC-related activities, including:

   (a) completion of a comprehensive climatology for jurisdictions within the region, building on the recently completed Pacific rainfall atlas—*A Precipitation Climatology at Tropical Island Stations; Effects of ENSO*—and including tropical cyclones as well as rainfall;

   (b) the importance of sustained support for PEAC activities and interest in expansion of PEAC-like climate assessment and applications capabilities throughout the region; and

   (c) the critical importance of close coordination between PEAC and the NMSDs in the region.

9. The meeting welcomed the report on the progress of the EU-funded Cyclone Warning System Upgrade Project which is providing further assistance to the strengthening of the NMSs for the participating countries. The meeting participants took note of accomplishments to date; reinforced their support for this project and encouraged PICs throughout the region to continue to identify opportunities for equipment upgrades, training and capacity-building through this project.

10. The participants welcomed the presentation from Chip Guard (University of Guam/Water and Energy Resources Institute) regarding efforts to adapt the Saffir-Simpson Tropical Cyclone Scale for use in tropical regions. Participants were encouraged to consider the applicability of this new tool for providing decision-makers in PICs with useful information regarding the potential impacts of

tropical cyclones on communities, businesses and infrastructure in the Pacific region.

11. The meeting participants were grateful for a number of informative presentations including the in-depth presentation from Dr John Zillman on the roles and responsibilities of NMSs and the presentation by the WMO representative on issues related to the international exchange of data under WMO Resolution 40 (Cg-XII). In discussing the exchange of data among SPREP NMSs, the meeting urged members to adhere to WMO Resolution 40. During subsequent discussions, the meeting participants engaged in a discussion relating to the importance of ensuring adequate representation for the region in formal international bodies such as the WMO Congress and Executive Council and the Intergovernmental Panel on Climate Change.

12. The meeting was informed of the numerous training activities undertaken in the region. It urged NMSs to inform the Secretariat of specific training needs and identify appropriate candidates for ongoing and future training programmes as a high priority responsibility. It urged the WMO to ensure that the WMO subregional office for the South-West Pacific accord this the highest possible priority. The meeting expressed concerns about some candidates from NMSs not fully utilising the opportunities afforded to them. In this regard, it urged all directors to take care to ensure that staff do not abuse these opportunities. It also urged NMSs to document the success of these training programmes in order to ensure that donors are willing to offer continued assistance. Meeting participants also identified the need to maintain qualified staff to ensure continuity of services.

13. The meeting explored a number of issues related to the provision of weather and climate products and services to the public and took special note of the unique challenges faced by smaller NMSs, particularly in terms of providing easily understood and graphically interesting products to the media. In this regard, the meeting recommended that NMSs within the region who have access to tools such as CD-ROM and other graphics software should forward copies of such tools to the SPREP Secretariat for distribution throughout the region. A suggestion was put forward that resources be made available through SPREP and WMO to develop a CD-ROM (or other software) tailored for use by NMSs in the Pacific. The meeting recommended that funding be sought to organise a media workshop for NMSs in the Pacific which would provide an opportunity to enhance local capability to work with the media.

14. The meeting identified the need for a formal reporting mechanism whereby the findings and recommendations of these meetings could be communicated to the highest level of governments in order to raise the profile of the programmes and needs of NMSs in the Pacific region. It further urged each NMS to pay for its own participation in light of the difficulties encountered by the SPREP Secretariat in securing sufficient funds to organise this annual meeting.

15. The meeting recognised the importance of long-term planning for regional meteorological, hydrological and climate programmes. Individual NMSs were urged to develop their own individual plans as well as supporting efforts by the SPREP Secretariat to formulate a long-term strategic action plan to support meteorological programmes and activities throughout the region. Given the number and variety of development agencies and donor-sponsored activities in the region, the meeting requested that the SPREP Secretariat should convene a meeting of these partners to develop an integrated approach in support of this long-term plan.

16. The meeting took note of the progress report presented by the SPREP Secretariat on their ongoing activities in the area of climate including:

    (a) Pacific Islands Climate Change Assistance Programme;

    (b) status of the ongoing United Nations Framework Convention on Climate Change (UNFCCC) negotiations;

    (c) Climate Change and Sea Level Rise Monitoring Programme; and

    (d) meteorological activities such as this meeting.

    The meeting expressed appreciation to the SPREP Secretariat for the comprehensive report and encouraged the Secretariat to continue these important programmes. Discussion included concerns about the lack of an AusAID-funded project on meteorological observations as a follow up to the Pacific Meteorological Services Project (PMSP) which was initiated by AusAID through the World Meteorological Organization and the Australian Bureau of Meteorology and

completed in 1997. The meeting urged Australia to explore opportunities to continue the follow-up technical support and maintenance. The Bureau of Meteorology informed the meeting that it would do what it could by way of a very basic level of ongoing support, but the prospect of a major new phase of PMSP or some other follow-on arrangement would depend critically on the outcome of a forthcoming review by an AusAID consultant of what has been achieved and what are the perceived future needs within the region.

17. The meeting noted with satisfaction the activities and programmes of the Nadi Regional Specialised Meteorological Centre/Tropical Cyclone Centre (RSMC/TCC), as specified by the operation plan of WMO RA V Tropical Cyclone Committee for the South-West Pacific and the South-East Indian Ocean. The meeting took note of the completion of the upgrade of the Nadi RSMC.

18. The meeting noted with appreciation the progress report provided by Dr Bill Clements on the present status of implementation of the US Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) program in the Tropical Western Pacific. It further noted the valuable contribution this project has made to the region and internationally on data collection and urges the US Government to continue its support to this programme. The meeting also recommended that the ARM program and relevant countries involved work together to ensure that operational meteorological data be made available in real time to interested parties.

19. The meeting was provided with a briefing by the South Pacific Applied Geoscience Commission (SOPAC) regarding its activities in support of meteorological, natural disaster and climate programmes in the region. The meeting welcomed the SOPAC presentation and urged SOPAC to work closely with SPREP to avoid duplication of activities.

20. The meeting was informed of the offers by French Polynesia and Samoa to host the sixth meeting of RMSDs in either Tahiti or Apia in August 1999. The meeting was also informed of the offer by the EU Cyclone Warning System Upgrade Project (CWSUP) to jointly host the sixth SPREP RSMD and the Steering Committee of the EU CWSUP meeting scheduled for July in Port Moresby, Papua New Guinea. The meeting unanimously agreed that the SPREP Secretariat should pursue these offers and decide which would be the best place for the 1999 meeting.

21. The meeting expressed its deep appreciation to the US Government, in particular the NOAA National Weather Service (NWS), Pacific region, Honolulu and the US DOE ARM program; the WMO; the Australian Government through the Bureau of Meteorology and AusAID; the New Zealand Government through Meteorological Service of New Zealand Ltd; the French Government through Meteo France and other sponsors for organising and supporting the Y2K Workshop and meeting.

Report of the meeting

1. Introduction

The Fifth SPREP Meeting of RMSDs was held in Honolulu, Hawaii, from 11 to 13 November 1998 at the Double Tree Alana Waikiki under the chairmanship of Mr Richard Hagemeyer, Director of the US NOAA NWS, Pacific region.

The meeting follows the Fourth SPREP Meeting of RMSDs held in Apia, Samoa from 8 to 10 July 1997. The meeting was funded by the WMO, the US Government NOAA NWS, the US DOE ARM program, the Australian Bureau of Meteorology, AusAID, Meteo France and Meteorological Service of New Zealand Ltd.

The objectives of the meeting were to:

- review progress made since the 1997 SPREP Meeting of RMSDs towards strengthening regional cooperation in meteorological and climatological activities in the region;
- review ongoing activities in support of meteorological, climate and climate change activities in the region;
- formulate and develop strategies for securing long-term regional coordination in meteorological and climatological activities in the region; and
- assist the SPREP Secretariat in formulating and developing its climate change programme, particularly in the meteorological programmes.

2. Opening session (agenda item 1)

2.1 Opening ceremony

Honourable Terry Nui Yoshinaga, Senator and Chairperson, House of Energy and Environmental Protection Committee of the State of Hawaii officially opened the meeting at 9.00 am on 11 November 1998. In her welcoming address, Honourable Yoshinaga extended a warm welcome to all the participants on behalf of the State of Hawaii and the Government of the United States. She thanked the organisers and sponsors of the meeting, particularly the US NOAA NWS for hosting the meeting in Honolulu. Hon. Yoshinaga drew the attention of the participants to the objectives of the meeting and urged them to ensure that these be met by the conclusion of the meeting. She highlighted some of the key issues which needed to be addressed, in particular the need for NMSs in the region to be ever more responsive to the needs of their clients for weather services and products, particularly through the provision of effective advisory and warning services for the protection of life and property. She cited the devastating impacts of the 1997–1998 El Niño on the Pacific region as a prime example of how critical it was to have a fully functioning and effective national meteorological service to support government activities, particularly in emergency responses. She noted that most countries in the region were still facing emergency responses due to droughts brought about by ENSO. She wished the meeting success.

Mr Tamarii Tutangata, Director of SPREP, in his keynote address extended his deep appreciation and that of the SPREP Secretariat and its member countries to the Governor and people of Hawaii, and to the Government of the United States for generously hosting the meeting in exciting Hawaii. He noted that this meeting was the first time that a SPREP-organised meeting had been held in Hawaii and hoped there would be more to come so that Pacific island countries could learn from the experiences of Hawaii, especially in relation to the environment and sustainable development. He was pleased to note the participation of General Jack Kelly, Head of the US NOAA NWS, Washington DC, for the first time in the SPREP Meeting of RMSDs and hoped his presence would lead to further strengthening of the cooperative efforts between the US NOAA NWS and the NMSs of PICs. Mr Tutangata also paid special tribute to Mr Richard Hagemeyer and Mr Edward Young and the staff of the US NOAA NWS, Pacific region, in Honolulu for the excellent arrangements made for the meeting and the Y2K Workshop which preceded the meeting. He acknowledged the presence of Dr John Zillman, Permanent Representative of Australia to WMO, and President of WMO at the meeting. He noted Dr Zillman's commitment towards strengthening the capacity of NMSs in the Pacific region and globally through his twin responsibilities in the Australian Government and WMO. Mr

Tutangata provided the meeting with some thoughts on the status of NMSs in the region since the First SPREP Meeting of RMSD. He highlighted the foundation laid by the First SPREP Meeting of RMSD held in Vanuatu in 1993 which continued to form the intellectual backbone of SPREP's approach towards its work with NMSs. He noted that since the Vanuatu meeting, excellent working relationships which had greatly assisted NMSs in the region had been established between SPREP and other regional and international organisations like the WMO, the US DOE ARM program and the EU CWSUP. He pointed out that since the First SPREP Meeting of RMSD, 14 of the 21 members making up Regional Association V of WMO were SPREP member countries. He further noted that since 1993 most NMSs had been equipped with much better facilities and improved telecommunication and observational networks, and that the Nadi RSMC had been fully upgraded and formally designated by WMO as RSMC for the South-West Pacific. Despite these improvements, he noted that NMSs in the region still faced problems such as limited human and financial resources, and were heavily dependent on financial and technical support from external donors. As a result the NMSs were vulnerable to donor-driven policy. He also highlighted the problem of aging meteorological instruments, shortage of meteorologists and technical experts in many NMSs and the newly emerging moves in some quarters to commercialise, corporatise or privatise NMSs. He acknowledged that these problems were complex, and required careful consideration and coordinated efforts by all involved. He hoped the meeting would be able to share knowledge and experience in meeting these challenges. He assured the Directors that SPREP would make every effort to assist them to implement the recommendations that would come out of the Honolulu meeting. He wished the meeting every success. A full copy of Mr Tutangata's speech is reproduced as Annex 1 to this report.

2.2 Election of Chairperson

The meeting unanimously elected the Head of the US NOAA NWS, General Jack Kelly, to chair the meeting. Given that he was not in time for the opening ceremony, Mr Richard Hagemeyer, Director of the US NOAA NWS Pacific region, was elected to chair the meeting on behalf of General Kelly.

2.3 Election of Chairperson of the Drafting Committee

Mr Henry Taiki, Director of the Vanuatu National Meteorological Service was unanimously elected as Chair of the Drafting Committee. The meeting agreed not to appoint members of the Drafting Committee but instead urged participants to volunteer their services in assisting Mr Taiki and the SPREP Secretariat to draft the report of the meeting.

2.4 Adoption of the agenda

The meeting adopted the agenda proposed by the Secretariat, which is reproduced as Annex 2 to this report.

2.5 Working arrangements

The necessary arrangements concerning the working hours and the allocation of agenda items of the meeting were discussed. The meeting agreed that all matters on the agenda be dealt with in the order in which it was proposed in the agenda, recognising that participants could revise the order of the discussion and agenda at any time. A full list of the documents presented at the meeting is contained in Annex 3.

3. Review of conclusions and recommendations from past meetings (agenda item 2)

3.1 Fourth SPREP Meeting of Regional Meteorological Service Directors, July 1997

Mr Lefale of the SPREP Secretariat introduced a paper on this agenda item. He highlighted the work carried out by the SPREP Secretariat jointly with WMO, the EU CWSUP and each NMS in addressing the recommendations of the Fourth SPREP Meeting of RMSD. He noted that a majority of the recommendations had already been implemented. The Chairman invited participants to express general views on the SPREP Secretariat's presentation.

The WMO representative, Mr Al-Majed highly commended the presentation by SPREP. He noted that since the adoption of the new fixed agenda at the Fourth SPREP Meeting of RMSD in Samoa, a more focused approach and a number of issues have emerged for discussion at this meeting. He also acknowledged the improvement in implementing projects since SPREP and WMO began to work together. He drew attention to the proposed establishment of the WMO subregional office in Apia, Samoa which would bring the two organisations together to work closely on regional programmes and activities. He urged all parties involved in the development and strengthening of NMSs in the South-West Pacific to work closely together in the future to avoid duplication of activities and to ensure the best use of the limited resources available to the

region. The meeting took note of the Report of the SPREP Secretariat.

3.2 WMO Regional Association (RA) V Meeting, Bali, Indonesia, September 1998

Mr Al-Majed of the WMO Secretariat introduced a summary report on the outcome of the WMO RA V meeting in Bali, Indonesia, from 14 to 21 September 1998. The Bali meeting was attended by 36 participants of which 33 were from 14 members of the Association, one was an invited expert and two were observers from regional and international meetings. Some of the highlights from the Bali meeting were the election of Dr Lim Joo Tick (Malaysia) and Dr R. Sri Diharto (Indonesia) as President and Vice-President of the Association, the approval of 16 resolutions and the establishment of four working groups instead of the five. The four newly established working groups were Working Group on Planning and Implementation of the World Weather Watch (WWW) in Region V, Working Group on Climate Matters, Working Group on Hydrology and RA V Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean. The meeting replaced the old Working Group on Agricultural Meteorology with a Rapporteur on Agricultural Meteorology.

With regard to the full implementation of the WWW Programme in the region, the session noted that the apparent low percentage SYNOP and TEMP parts A remained about the same in 1997 compared to 1996. It also noted the closure of the OMEGA radio navigation system which had a significant impact on upper-air networks in the region.

The Association noted with concern that the high cost of GPS radiosondes has resulted in a reduced upper-air programme in the region. Due to budget limitations, a significant number of NMSs were forced to reduce the number of soundings they make. The Association also expressed concern about the potential deterioration of the upper-air component of the Global Observing System (GOS) particularly as this would reduce the ability to provide warnings and forecasts for meteorological and hydrological events that cause natural disasters and to understand climate variability and predict climate change.

The session also discussed the establishment of Regional Instrument Centres (RICs). It accepted the offers by Australia and the Philippines to use the facilities of their respective national instrument centres in Melbourne and Manila for regional purposes and agreed on their designation as RICs.

The 1997–1998 El Niño event, which brought drought to many parts of the region and consequently an increase in the severity of forest fire and smoke haze, was discussed in Bali. The Association commended the Secretary General for his leadership role in arranging for the preparation and dissemination of El Niño updates, which had been very useful for briefing the media and government officials. The session showed much interest in the WMO Climate Information and Prediction Services (CLIPS) project and urged members to give particular attention to strengthening this activity.

The development of the World Weather Research Programme (WWRP) was fully supported by the session. It considered that this would be of benefit to the region. The session discussed the progress in the development and implementation of the World Hydrological Observing System (WHYCOS). The Association recommended that the proposal of a Pacific HYCOS be further developed.

With respect to the education and training activities, the session stressed the importance of the human resources development programme in assisting National Meteorological and Hydrological Services (NMHSs), particularly in developing countries, to plan and mobilise financial and other resources to meet members' training needs. It urged its members to make every effort to develop national plans for human resource development in order to become self-reliant in the basic training of meteorological and hydrological personnel. While the Technical Cooperation Programme was discussed, the sessions showed great concern about the Programme to address Association of South East Asian Nations (ASEAN) Regional Trans-boundary Smoke (PARTS) and expressed the need for the project to be implemented as soon as possible with full participation by NMHSs of countries concerned.

The session also had a lengthy discussion on the issue of exchange of meteorological and related data and products. The Association urged its members to reaffirm and reinforce the spirit of Resolution 40 (Cg-XII) and adhere to its principles, particularly those relating to the free and unrestricted exchange of data and products.

The Association also discussed the establishment of the WMO subregional office for the South-West Pacific in Apia, Samoa, especially its role in technical cooperation activities. The session agreed that the present arrangement in which the office is located in Geneva at the WMO Headquarters should continue.

The session also held informal meetings for participants to exchange views and share experiences on matters such as non-attendance of some members of RA V at the Bali session, the support needed for the subregional office for the South-West Pacific when established, the attendance of RA V members in the forthcoming session of the Thirteenth Congress in

May 1999 and the number of Economic Community (EC) seats allocated for RA V and the expected impacts of La Niña in some countries of the region.

During the discussions on this agenda item, both Australian and US representatives complimented Mr Lefale for his invaluable contribution to the Bali session, which allowed regional activities implemented by SPREP and other organisations to link in with WMO RA V programmes.

4. Meteorological programme

4.1 Regional Specialised Meteorological Centre (RSMC) report on activities (agenda item 3.1)

Mr Prasad, Director of the Fiji Meteorological Service (FMS) and Fiji RSMC reviewed the activities of the RSMC since the last meeting. He highlighted some of the completed activities and the challenges RSMC would address in the future. One of the major highlights of achievements since the Fourth SPREP Meeting of RSMD was the completion of the new Headquarters for the RSMC in March 1998. He thanked the Japanese Government, the New Zealand Government and other organisations such as WMO for financial and technical assistance to the project. He specifically paid tribute to the Bureau of Meteorology of Australia for the provision of technical assistance over many years to the RSMC. In summary, the RSMC was:

- fully operational to fulfil its role in its area of responsibility;
- receiving substantial support from extended sources;
- working towards self-sustainability;
- following up the recommendations of the Report of the Review of the Fiji Meteorological Service prepared by New Zealand for the Fiji Government;
- supporting training at national and international levels; and
- formalising arrangements with other PICs' National Meteorological Services on what kind of services are required from the RSMC.

French Polynesia congratulated the FMS on the completion of its new Headquarters. He drew the attention of the Directors to the vast improvement in forecasting products, particularly tropical cyclone warnings, since the completion of the RSMC upgrade. He also congratulated the RSMC for the excellent training they had undertaken in the past. He requested that the Report of the Review of the FMS conducted by Meteorological Service of New Zealand Ltd be made available to all Pacific NMSs. Mr Prasad agreed to provide this report on a request basis free of charge.

Mr Ausetalia Titimaea, Director of the Samoa Meteorological Service, also congratulated the RSMC for the completion of its new Headquarters. He thanked the RSMC for the continued support to the Samoa NMSs and urged the RSMC to continue to provide this service. In the Report of the Review of the FMS, he expressed concerns about the likely implications for other NMSs which, like his Service, rely on the RSMC, if the FMS were to be fully commercialised as recommended by the report. He reiterated the need for all NMSs to reaffirm and reinforce the spirit of WMO Resolution 40. He requested that Resolution 40 be adhered to if the Fiji RSMC were to be fully commercialised.

Mr Sionetasi, Director of the Niue NMS also congratulated Fiji RSMC for the excellent work done in the past year in serving his country. However, he expressed concerns that the RSMC should adhere to the procedures agreed to under the WMO Tropical Cyclone Action Plan when issuing forecasts and warnings for his country via international media outlets like Radio New Zealand International. He requested that Fiji RSMC should delay the issuance of Niue forecasts and warnings to the international media and public for at least an hour to allow his staff to analyse the warnings before issuance to the media and public. The Chairman requested that Fiji RSMC and Niue discuss this matter during the break.

4.2 National reports (agenda item 3.2)

The Chairman invited all Directors to provide a review of their meteorological activities since the Fourth SPREP Meeting of RMSD. Full copies of country presentations made available to SPREP are reproduced in Annex 4. The presentations were given in the following order: Australia, Cook Islands, Federated States of Micronesia, French Polynesia, New Caledonia, Kiribati, Marshall Islands, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, United States of America, and Vanuatu.

The WMO representative, having heard all the country presentations, thanked each Director for the excellent update on their activities. He noted that the most common problems faced by each NMS in the region were similar to those also faced by NMSs in other developing regions such as Africa: lack of human and financial resources and the need for more training, education and capacity building activities. He stressed that WMO was set up to facilitate and

encourage activities amongst its members so that they could assist each other. He urged those countries in the South-West Pacific region who had not yet become members of WMO to seek admittance to WMO so they could benefit from WMO programmes.

5. Climatological programme (agenda item 4)

During the country presentations under agenda item 4, the countries were also requested to provide an update of their climatological activities. The climatological activities of each country are included in the country national reports presented in Annex 4.

6. Capacity building (agenda item 5)

6.1 Role and operations of National Meteorological Services

In view of the new challenges facing NMSs in the Pacific region and worldwide, such as the need to deal with climate change and other new environmental issues, involvement in new tasks related to International Conventions that had recently come into force (e.g. UN Framework Convention on Climate Change), and commercialisation and government reforms, the meeting invited Dr John Zillman, Director of the Commonwealth Bureau of Meteorology and President of WMO, to give a presentation on the role and operations of NMSs.

Dr Zillman provided the meeting with a full paper titled 'The National Meteorological Service' and gave an hour presentation on the topic. Some of the highlights from Dr Zillman's presentation included:

- an overview of the traditional role of the NMSs within the national infrastructure of all countries;
- the fundamental obligations accepted by governments when establishing NMSs;
- mission and functions of modern NMSs; and
- services provided and the new challenges now facing NMSs, such as commercialisation, free exchange of data, the need to increase the status and visibility of NMSs in order to compete in a commercial environment, the need to establish solid foundations of NMSs through the adoption of appropriate legislative acts defining their missions, mandate and responsibilities.

He concluded that most aspects of the environment within which the traditional state-funded NMS has operated, and even the nature of the NMS role itself, are evolving rapidly. With communities' and nations' basic requirements for reliable meteorological data and services and the pressures for their application to a wide range of economic, social and environmental objectives continuing to increase, it is extremely important that the evolution process be well and wisely managed by NMSs. He believed that the NMS would serve an increasingly vital role in contributing to the social, economic and environmental progress of all countries during the next century. The meeting expressed its appreciation to Dr Zillman for the excellent presentation and encouraged each Director to take note of Dr Zillman's paper.

6.2 Y2K Workshop report (agenda item 7.1)

Mr Howard Diamond of the US NOAA NWS and Mr John Lincoln, WMO consultant on Y2K issues gave a presentation to the meeting on the outcome of the Y2K Workshop held prior to the Directors' meeting. The Summary and Recommendations of the Y2K Workshop are reproduced as Annex 5 to this report. Mr Diamond gave an overview of what the USA NOAA NWS had already done to address the Y2K problem and the strategy the US NOAA NWS was employing to ensure all their systems would be Y2K compliant. Mr Lincoln gave an overview of the Y2K problem and highlighted the key sectors that could be affected. He urged Directors to review the recommendations of the Y2K Workshop. He highlighted the poor response from WMO member countries to the questionnaire on Y2K compliance sent out to the members in 1997. He also noted the poor response from manufacturers. He encouraged all SPREP NMSs to do an inventory and check list on their equipment and computers and ensure full compliance by December 1999.

The meeting welcomed the convening of the Y2K Workshop and thanked the sponsors of the workshop. Having examined the workshop report and taking note of the presentations by Mr Howard and Mr Lincoln, the meeting unanimously adopted the workshop report. During discussions on this agenda item, Mr Lumsden of Meteorological Service of New Zealand Ltd offered to provide technical assistance to NMSs which rely on New Zealand's assistance. The meeting took note of the New Zealand offer. The meeting recommended that SPREP and WMO, in collaboration with the US NOAA NWS, Meteorological Service of New Zealand Ltd and other parties form a task team to assist NMSs of Pacific island countries to ensure that all meteorological equipment is fully compliant by December 1999. The SPREP, WMO and US NOAA NWS confirmed their willingness to be part of the task team. During the discussion, Niue, Cook Islands, Tuvalu and Kiribati thanked Meteorological Service of New Zealand Ltd

for its assistance in checking their equipment for Y2K compliance. The meeting participants sought confirmation that Meteorological Service of New Zealand Ltd would join the Task Team and provide resources. Mr Lumsden confirmed his Service's willingness to offer resources to assist NMSs in the region to implement recommendations of the Y2K Workshop in consultation with the SPREP Secretariat.

6.3 The Saffir—Simpson Tropical Cyclones Scale for Pacific island countries (agenda item 8)

Mr Charles Guard (University of Guam) described the Saffir–Simpson Tropical Cyclone Scale (SSTCS) normally used in the Atlantic Basin to measure cyclone impacts and vulnerability on environments and economic sectors. The SSTCS has two purposes: firstly, it was developed to assist decision-makers and communities to get an idea of the damage expected from a cyclone; secondly, it can be used by meteorological observers to assess the intensity of the tropical cyclones when the instruments are not available.

He concluded that the SSTCS can be modified to suit PIC situations, especially when decision-makers and meteorological officers of NMS are measuring vulnerability and resilience.

The meeting welcomed the presentation by Mr Guard. Participants were encouraged to consider the applicability of this new tool for providing decision-makers in PICs with useful information regarding the potential impacts of tropical cyclones on communities, businesses and infrastructure in the Pacific region.

6.4 Items under this agenda item were covered under agenda item 2.

6.5 International data exchange–WMO Resolution 40 (agenda item 5.2)

Mr Al-Majed, WMO representative, briefed the meeting on this topic paying particular attention to WMO Resolution 40 (Cg-XII). He gave an overview of the history of the WMO position regarding its policy and practice on the issue of exchange of meteorological data. He urged NMSs to refer to the WMO Report No. 837 (1996) which provided detailed information.

He encouraged all WMO members to respect Resolution 40 (Cg-XII) and work together in freely exchanging meteorological data in the spirit of collaboration and cooperation to achieve economic sustainability.

Mr Al-Majed reiterated that the purpose of Resolution 40 (Cg-XII) was to secure the stable, cooperative international exchange of meteorological and related data and products needed to provide universal services in support of strategy, security and economic benefits and to meet the requirements of World Weather Watch and of other WMO programmes.

The Samoa delegation, Mr Ausetalia Titimaea, thanked WMO for the presentation and urged the Directors to respect and adhere to Resolution 40 (Cg-XII).

6.6 Education and training–regional aspects (agenda item 5.3)

Mr Al-Majed informed the meeting about ongoing WMO Education and Training programmes in the WMO RA V region. He stressed that training and capacity building are important for any small island countries in achieving economic sustainability. He later outlined the 1997–1998 training activities sponsored by WMO that have benefited members of RA V. These included:

- a six-month training course for a number of smaller island countries on WMO Class 4;
- training at the WMO centre in the Philippines;
- study tours for Small Island Developing States (SIDS) Directors to China; and
- scholarships for 49 participants of RA V in the period 1994–1997.

During the discussion on this agenda item, Fiji, Cook Islands, Australia and Samoa recommended that WMO and SPREP should identify specific training needs for PIC NMSs. The meeting recommended that this matter be given the highest priority and urged WMO and SPREP to develop a coordinated training programme for the region.

Mr Al-Majed stated that WMO would review its training programmes in light of the concerns expressed by this meeting. He noted that WMO and SPREP would look into the development of regional training programmes with specific focus on the needs of the South-West Pacific region once the WMO subregional office for the South-West Pacific officially opened in 1999. He acknowledged that the identification of training needs for NMSs in the South-West Pacific is one of the key responsibilities of the WMO Subregional Office Programme Officer.

Australia commented on its training programmes and activities for PIC NMSs. These included training in Australian institutions and other institutions in the region. Dr John Zillman urged PICs to provide Australia with feedback on its training courses. The feedback from those benefiting from Australian training programmes would be invaluable in assisting the Australian Bureau of Meteorology to improve its programmes and to secure the required funding from the government to carry them out.

Cook Islands expressed concerns about some candidates from PIC NMSs not fully utilising the training opportunities afforded to them via WMO, the Bureau of Meteorology and other services. This had created a bad name for PIC NMSs. Mr Arona Nragi, Cook Islands Director of Meteorology, urged the meeting to ensure that staff do not abuse these opportunities. The meeting endorsed Cook Islands' concerns.

6.7 Information and Public Affairs Programme–regional aspects (agenda item 5.4)

Mr Al-Majed gave a presentation on WMO's Information and Public Affairs Programme that is aimed at increasing the visibility of NMSs within their countries. The programme:

- contributed to the EXPO 1997 in Portugal;
- developed factsheets, posters, reports, newsletters and press releases for international consumption;
- established WMO RA V National Focal Points in the Pacific region;
- developed the WMO homepage (http://www.wmo.cn); and
- with NWS published and promoted WMO products widely at regional and international forums (e.g. UNFCCC).

Samoa requested that in order to increase the visibility of NMSs, the WMO make available to all NMSs in the region appropriate computer software to promote to the general public the services provided by each NMS. WMO and SPREP were asked to look into this matter and to assist NMS efforts in 1999 to promote the WMO Water Day Celebration.

The French Polynesian delegation offered assistance to those SPREP governments who need software to assist with their local TV weather promotion. The meeting called on WMO to explore the possibility of developing suitable software for weather forecasting for local TV awareness and promotion.

The meeting took note of the unique challenges faced by smaller NMSs regarding provision of weather and climate products and services to the public, particularly in terms of providing easily understood and graphically interesting products to the media. The meeting recommended that NMSs in the region who have access to tools such as CD-ROM and graphic software should forward copies of such tools to the SPREP Secretariat for distribution throughout the region.

6.8 Technical Cooperation Programme–regional aspects (agenda item 6.3)

Mr Al-Majed briefed the meeting on the WMO Technical Cooperation Programmes, particularly those applied to RA V and SPREP member countries. He noted that Niue, Papua New Guinea, FSM, Tonga, Samoa (CLICOM systems), Solomon Islands (upgrading of Digi-Cora) and Vanuatu (Satellite, EMWIN, CLICOM and radar) have all benefited from this programme in 1998.

Australia recommended that SPREP and WMO should start thinking about developing a strategy to accommodate funding for the members.

6.9 Institutional arrangements–regional aspects (agenda item 6.4)

Mr Al-Majed of WMO and Mr Lefale of SPREP Secretariat briefed the meeting on efforts by the two organisations to strengthen regional cooperation in meteorology, climatology and hydrology and other related issues that are unique and of common concern to the South-West Pacific, taking into account their particular local and national situations. Mr Al-Majed highlighted the major scientific and technical programmes of WMO and its related regional programmes while Mr Lefale focused on SPREP efforts to streamline regional meteorological programmes so that limited resources are better utilised for the benefit of NMSs in the region. The roles and functions of the proposed WMO subregional office for the South-West Pacific to be located within the SPREP Secretariat in Samoa were also discussed under this agenda item.

6.10 Long-term planning activities–regional aspects (agenda item 6.5)

Mr Al-Majed briefed the meeting on the draft WMO Fifth Long-Term Plan (5LTP) prepared and endorsed by the WMO Executive Council at its fiftieth session held in Geneva in June 1998. Mr Al-Majed stressed the importance of the draft 5LTP and urged Directors to attend the Thirteenth WMO Congress to be held

in Geneva in May 1999, in which the 5LTP will be discussed and adopted. Mr Al-Majed urged the Directors to pay closer attention to Regional Association V priorities contained in the draft 5LTP which were agreed to at the RA V meeting in Bali.

6.11 Emergency Weather Information Network (EMWIN) (agenda item 7.2)

Mr Colin Schulz, Consultant to SPREP on EMWIN, gave a presentation to the meeting. He noted that since the last SPREP RMSD meeting, there has been a major step forward in including Pacific islands data on the EMWIN transmissions. He noted that by early 1999 more than 25 EMWIN receiving systems will have been installed for the Weather Services and Emergency Management offices in PICs. These systems have been funded by US NWS, EU Project and SPREP in a cooperative effort.

During the discussion, the US National Weather Service assured the meeting that it would provide continuing support to the Pacific islands. The meeting expressed its appreciation to the US NWS for its assistance in providing this service. The existing PC-based systems are suitable for use in the major offices but there is a growing need for a simple and cost effective 'low technology' solar-powered terminal that could be installed in many Pacific island communities to give them the advantage of a simple but efficient warning system. This concept will be investigated as time and funding permits. A number of add-on programmes which allow plotting of cyclone tracks and analysis of synoptic data are now being developed and SPREP hopes to make these available to PICs when the development work is complete. During 1999 it is intended to carry out in-country training in the operation and maintenance of EMWIN equipment and the add-on programmes.

6.12 QFax satellite projects (agenda item 7.3)

Mr Colin Schulz, SPREP consultant on the QFax satellite project, introduced his report on the status of the project since the last meeting. He noted that all countries that were included in the original proposals have been equipped with the QFax satellite imaging equipment. In addition, the EU Project has provided a QFax installation for Tuvalu. All systems are fully functional and providing valuable service to PICs.

In addition GPS clocks have been purchased to improve the accuracy of satellite tracking and they will provide more accurate gridding of polar orbiter images. Some countries have indicated that they would like to operate QFax on their local network and this will be investigated. There are some third party Windows versions of QFax software being developed but as yet none of these are sufficiently developed to carry out a trial in the region. Another concern has been the mapping database for the map overlays. Many of the smaller islands are not included in the present maps and some work has been carried out with a view to improving the maps, but this will take time. The next generation of satellites, which will use purely digital transmissions, will be placed in service during the year 2000 and SPREP will need to look at the requirements to enable reception of this new format. Global Meteorological Satellites (GMS) will be the first system to be replaced with the new all-digital signals but the Japan Meteorological Association (JMA) has indicated that it will continue the existing analogue transmissions for some time to allow users to make the necessary changes to their receiving equipment.

6.13 EU Cyclone Warning System Upgrade Project (CWSUP) (agenda item 7.4)

Mr Neville Koop, Project Coordinator of the EU CWSUP based in the Forum Secretariat in Fiji, briefed the meeting on the status of implementation of the project. He highlighted a number of activities already being implemented, including training, upgrading of telecommunication systems and other technical programmes. He noted that a close working relationship developed between his project and SPREP which enabled a number of projects to be successfully implemented in the region.

The participants welcomed the report on the progress of the EU funded CWSUP which is providing further assistance to the strengthening of the National Meteorological Services for the participating countries. The participants took note of accomplishments to date; reinforced their support for this project and encouraged PICs throughout the region to continue to identify opportunities for equipment upgrades, training and capacity building through this project.

6.14 SPREP activities (agenda items 7.7, 7.7.1, 7.7.2, 7.7.3, 7.7.4, 7.7.5, 7.7.6, 7.8 and 7.9)

The meeting took note of the progress reports presented by the SPREP Secretariat on its ongoing activities in the area of weather, climate and climate change. These include: Pacific Islands Climate Change Assistance Programme (PICCAP); status of the ongoing United Nations Framework Convention on Climate Change (UNFCCC) negotiations; Climate Change and Sea Level Rise Monitoring Program (CCSLRP); SPREP Research programmes; and

proposals presently under development such as the regional bulletin, Climate Data Resources for Environment and Sustainable Development (CDRESD), Hydrological and Water Resources and meteorological activities such as this meeting. The meeting thanked the SPREP Secretariat staff for the comprehensive reports and encouraged the Secretariat to continue these important programmes.

During the discussion of these agenda items, some countries expressed concerns about the lack of an AusAID-funded project on meteorological observations as a follow up to the Pacific Meteorological Services Project (PMSP) which was initiated by AusAID through the WMO and the Australian Bureau of Meteorology and completed in 1997. The meeting urged Australia to explore opportunities to continue the follow-up technical support and maintenance. The Bureau of Meteorology informed the meeting that it would do what it could by way of a very basic level of ongoing support but the prospects of a major new phase of PMSP or some other follow-on arrangement would depend critically on the outcome of a forthcoming review by an AusAID consultant of what has been achieved and what are the perceived future needs within the region.

The meeting recognised the importance to the region of providing an integrated programme of forecast and information services which addresses the continuum from weather to climate, including issues related to hydrology and water. The participants noted the critical role that SPREP is playing in supplementing WMO and national efforts in the area of weather and climate and encouraged SPREP to continue to provide a forum for National Meteorological Services in PICs to: identify critical issues; promote collaboration in the development of shared solutions to common problems; enhance awareness of weather and climate issues and programmes at appropriate levels of government in the region such as the ministerial level; and identify opportunities to improve regional capacity to forecast, understand and address the impacts of weather and climate.

Specifically, the meeting participants unanimously agreed that the SPREP Secretariat should broaden its scope of work to cover meteorology and climate matters in addition to its climate change programmes. In this regard, the meeting urged SPREP to develop a long-term strategic plan for the Pacific region taking into account the WMO Fifth Long-Term Plan and the priority areas agreed on at the WMO Regional Association V meeting in Bali, Indonesia in September 1998. To address the needs of PICs related to weather and climate monitoring, forecasting, assessment and applications, the meeting urged the SPREP Secretariat to pursue appropriate mechanisms to establish a special purpose fund to supplement existing sources of support (from national governments, donor nations and WMO).

6.15 US Department of Energy Atmospheric Radiation Measurement (ARM) Program (agenda item 7.10)

Dr Bill Clements gave a presentation on the current status of implementation of the US DOE ARM program in the Tropical Western Pacific. The participants noted with appreciation the progress report provided by Dr Bill Clements and thanked the US DOE ARM program for its support to SPREP and the region. The meeting also took note of the valuable contribution that the ARM project has made for the region and internationally on data collection and urged the US Government to continue its support to this programme. The meeting also recommended that the ARM program and relevant countries involved work together to ensure that operational meteorological data be made available in real time to interested parties.

6.16 South Pacific Applied Geoscience Commission (SOPAC) (agenda item 7.14)

The meeting was provided with a briefing by the South Pacific Applied Geoscience Commission (SOPAC) regarding its activities in support of meteorological, natural disaster and climate programmes in the region. The meeting welcomed the SOPAC presentation and urged SOPAC to work closely with SPREP to avoid duplication of activities.

6.17 Other matters (agenda item 8.0)

- Preparations for the WMO Congress in 1999 (agenda item 8.1).

- Mr Al-Majed, WMO representative, briefed the meeting about the arrangements for the Thirteenth WMO Congress to take place in Geneva from 4 to 26 May 1999. The Directors thanked Mr Al-Majed for the briefing.

- Any other matters (agenda item 8.2).

The meeting was informed of the tour of the US NOAA NWS Headquarters by the Chairman, Mr Richard Hagemeyer. He suggested that the meeting break to allow the SPREP Secretariat to finalise the Draft Meeting Summary and Recommendations during the tour. The meeting concurred with the Chairman's suggestion.

6.18 Date and venue of the next meeting (agenda item 9.0)

The meeting was informed of the offers by French Polynesia and Samoa to host the sixth meeting of RMSDs in either Tahiti or Apia in August 1999. The meeting was also informed of the offer by the EU CWSUP to jointly host the Sixth SPREP Meeting of RSMD and the Steering Committee of the EU CWSUP meeting scheduled for July 1999 in Port Moresby, Papua New Guinea. The meeting unanimously agreed that the SPREP Secretariat should pursue these offers and decide which would be the best place for the 1999 meeting.

6.19 Consideration of the Meeting Summary and Recommendations (agenda item 10)

The Chairman, taking into consideration the lack of time available to fully consider the Draft Meeting Summary and Recommendations circulated by the SPREP Secretariat, suggested that the participants should take home the Draft and submit any comments and changes to the SPREP Secretariat within two full working weeks. The meeting unanimously endorsed the Chairman's suggestion.

6.20 Closure of the meeting (agenda item 10)

The Chairman, Mr Hagemeyer, closed the meeting. In his closing remarks, Mr Hagemeyer thanked all the participants for their contribution to making this meeting a success. He thanked all the sponsors and the SPREP Secretariat for organising the meeting. The meeting was officially closed by 6 pm on Friday 13 November 1998.

Annex 1: Opening statement to the Fifth SPREP Meeting of Regional Meteorological Service Directors (RMSD)

11 November 1998, Honolulu, Hawaii

Mr Tamari'i Tutangata, Director, South Pacific Regional Environment Programme (SPREP)

Honourable Terry Nui Yoshinaga, Chair of Energy and Environmental Protection Committee, State House of Representatives of Hawaii.

Mr Richard Hagemeyer, Director of the US NOAA National Weather Service for the Pacific Region.

Dr John Zillman, President of the World Meteorological Organization and Director of the Bureau of Meteorology of Australia.

Mr Eisa Al-Majed, Director of WMO's Regional Office for Asia and the South-West Pacific.

Distinguished Directors and Officers-in-Charge of Meteorological Services and Weather Offices in the SPREP region.

Ladies and gentlemen.

It is with a sense of privilege and pleasure that I join Honourable Terry Nui Yoshinaga, in extending a warm *aloha, kia orana* and welcome to you all to the Fifth SPREP Regional Meeting of Meteorological Service Directors. Special welcome to those who are attending this meeting for the first time.

To the Honourable Representative Yoshinaga and through you, to his Excellency the Governor, the Government and people of Hawaii, to the Government of the United States, please accept my deep appreciation and that of the Secretariat for the South Pacific Regional Environment Programme and SPREP member countries for your reaffirmation of being one with the Pacific island countries through generously hosting this meeting in exciting Hawaii. I am told that this is the first time that a SPREP-organised meeting has been held here in Hawaii and I sincerely hope that there will be more to come, Your Excellency, so that we can learn more from the experiences of your islands, especially in relation to the environment as it relates to sustainable development. Your Excellency's opening message will serve to inspire us during our meeting.

It is pleasing to note that General Jack Kelly, Head of the US NOAA National Weather Service in Washington DC will be joining us tomorrow. I am confident that General Kelly's presence will lead to further strengthening of the cooperative efforts between US NOAA NWS and the National Meteorological Services of Pacific island countries in particular.

I should also like to pay special tribute to Mr Hagemeyer and to Mr Edward Young, Chief, Technical Division as well as the staff of the US NOAA NWS, Honolulu for the excellent arrangements made for this meeting as well as the Y2K Workshop which concluded yesterday. Thank you for your assistance and the warm reception and hospitality accorded to all of us.

Allow me also to acknowledge the presence of Dr Zillman, in his capacities as Permanent Representative of Australia to WMO and President of WMO's Executive Council. Dr Zillman's commitment to strengthening the capacity of national meteorological services in the Pacific region and globally through his twin responsibilities in the Australian Government and WMO has been extremely valuable. We greatly appreciate your efforts, Dr Zillman, and look forward to your continued support and guidance and that of your government towards the NMSs of the PICs.

I should also like to acknowledge the presence of Dr John Lumsden, Chief Executive Officer, Meteorological Service of New Zealand Ltd.

Six years ago, in October 1993, the Honourable Edward Tabisari, then Minister for Health and Acting Minister responsible for Meteorological Services of the Government of Vanuatu, in officially opening the First SPREP Meeting of Regional Meteorological Service Directors, spoke of the strategic importance of the role and responsibilities of meterological services in protecting life and property from weather and climate events. In doing so, Hon. Tabisari also laid down a challenge to the NMSs in the Pacific and to the SPREP Secretariat. The 'Tabisari Challenge', as we have now coined it, called for 'continuing improvements in all the weather services of the Pacific for the betterment of mankind'. The Tabisari Challenge continues to form the backbone or rationale for SPREP's approach

towards strengthening the capacity of NMSs in the PICs.

Most of you here today participated at that Vanuatu meeting and we, in the SPREP Secretariat, consider it appropriate as we, collectively, go through the various agenda items for this meeting that we also take the time to look back and take stock of how far we have come since our first meeting six years ago. We should take time to reflect upon where we are today as a meteorological community and to consider the challenges that lie ahead of us if we are to adequately serve the urgent requirements not just of our respective national communities, but also of the regional and global communities. Are our weather services now providing more effective and accurate products than in 1993? Are the users of our products and services satisfied with their quality and timeliness? Do we, in your Secretariat, fulfil your expectations?

These are only examples of questions that we need to ask ourselves and openly discuss because only then will we be in a better position to target our efforts towards our respective shortcomings in the future. It is our hope that you will be able to identify key areas of priority concern for our collective attention, drawing on our experiences over the past six years. At last year's meeting, we took our initial step towards longer term planning by accepting time lines for climate-related projects that are in line within the Pacific islands region. We should continue to build on that initiative, including developing a mechanism for effectively evaluating and monitoring the progress that Pacific island countries are making in the implementation of activities that fall under the purview of this body in a manner that is sustainable both in terms of technology and resource capacity.

In this regard, we are fortunate in that the majority of representatives here have already had the opportunity to review the Fifth Long-Term Plan of WMO, especially in relation to WMO's Regional Association V (RA V). We consider this document to be the principal mechanism through which we will work together with WMO to identify common objectives, formulate overall policies and coordinate plans and to develop relevant projects to support NMSs in the Pacific island countries. In this context, I should like to commend WMO for initiating the process of prioritisation of activities for the region. We note that most of the priority activities already identified by WMO for RA V under its Fifth Long-Term Plan are in line with our own activities and goals.

In fact, SPREP has, over the past year, actively pursued the objective of merging our activities with those of other regional and international agencies in order to better utilise the limited resources available to our region and to avoid possible duplication of activities. In relation to WMO, this process will be greatly facilitated through the now imminent establishment of the WMO subregional office for the South-West Pacific within SPREP's offices. As part of this process, we intend, with the cooperation of all the region's development partners to draw up and maintain an inventory of active and proposed projects in the climate area. In this way, we will be better able to identify gaps that might exist and seek your guidance and that of the development partners in filling such gaps.

Recent experiences of extreme climate conditions in our region, including droughts and cyclones, have resulted in governments recognising the urgent need for more accurate and effective early warning systems as a means of mitigating the impact of natural disasters. Hopefully, this will translate into your respective governments making more resources available towards this end. There is an obvious need for each one of us to persuade our respective governments of the need for more resources to be made available towards effective warning systems and the application of forecasts to water resources management, agriculture and other key socioeconomic sectors. In recognising the need for governments to apply scarce resources towards key economic sectors, we have put together a draft proposal on fresh water for your consideration.

As I stated to you last year, your Secretariat has already recognised its own shortcomings in seeking to effectively implement your requirements as you have identified them over the past six years. You are probably aware that in his first year, 1997, with SPREP as our Climatology and Meteorological Officer, Mr Penehuro Lefale was only able to accord barely 50 per cent of his time to concentrate on work emanating from you. You may recall that at the time of your last meeting, we had just recruited the Project Manager and Scientific Officer for the Pacific Islands Climate Change Assistance Programme or PICCAP. About six weeks ago, we also recruited an International Negotiations Officer who will concentrate on climate change negotiations in relation to the UNFCCC. These developments have enabled us to relieve the pressure on Mr Lefale in terms of this global negotiations process and allow him to apply himself more fully to the task of implementing your requirements, including the preparations for this meeting and the Y2K Workshop. This has resulted in the majority of activities identified by your previous meetings having been implemented satisfactorily, as you will have learnt from the meeting documents. Indeed, with the greater technical capacity that now exists within the SPREP Secretariat in the climate change area, your Secretariat is now in a better position to service the requirements of this meeting more effectively and in a more timely fashion.

I should now like to extend the SPREP Secretariat's sincere appreciation to the donor/partner agencies that have enabled us to move more confidently towards longer term planning of climate activities generally and to weather/meterological activities in particular. WMO continues to be prominent in its assistance towards building and strengthening the capacities of National Meteorological Services. We acknowledge the ongoing and increasing assistance of the United States Department of Energy's Atmospheric Measurement Program in funding Mr Lefale's post and other major aspects of the climate programme. I also acknowledge the contributions of AusAID through funding the South Pacific Sea Level and Climate Monitoring Project over the last seven years, including funding Dr Chalapan Kaluwin's post at SPREP as Climate Change Officer. Japan has contributed significantly through the provision of the new Regional Centre in Nadi, Fiji. New Zealand Official Development Assistance (NZODA) continues to provide much needed support as well as the Global Environment Facility through the United Nations Development Programme. The European Union funded Cyclone Upgrade Project deserves special mention as well in this context. A relative newcomer in supporting the Pacific islands climate activities is the Government of Denmark.

I should also like to thank the sponsors of this meeting and the Y2K Workshop: the US NOAA NWS, the US DOE ARM program, the Bureau of Meterology of Australia, AusAID, Meteorological Service of New Zealand Ltd, Meteo France and WMO. Let me also thank the Management and staff of the Double Tree Alana Waikiki Hotel for the excellent facilities and services.

I wish you every success in your deliberations, especially in the critical areas that we will be considering over the next three days. May you all have an enjoyable stay in Honolulu.

Annex 2: Agenda for the Fifth SPREP Meeting of Regional Meteorological Service Directors (RMSD)

Honolulu, Hawaii

1. Opening session

- 1.1 Opening ceremony
- 1.2 Election of Chairperson
- 1.3 Election of Chairperson of the Drafting Committee
- 1.4 Adoption of the agenda
- 1.5 Working arrangements

2. Review of conclusions and recommendations from past meetings

- 2.1 Fourth SPREP Meeting of RMSD, July 1997
- 2.2 WMO Regional Association V Meeting, Bali, Indonesia, September 1998

3. Meteorological programme

- 3.1 Nadi Regional Specialised Meteorological Centre (RSMC) Report on Activities
- 3.2 National reports

4. Climatological programme

- 4.1 Climate issues
- 4.2 National reports

5. Capacity building

- 5.1 Role and operation of NMSs
- 5.2 International data exchange—Resolution 40 (Cg-XII)
- 5.3 Education and training—regional aspects
- 5.4 Information and Public Affairs Programme—regional aspects

6. National and regional coordination

- 6.1 SPREP Climate Change Programme
- 6.2 WMO subregional office for the South-West Pacific
- 6.3 Technical Cooperation Programme—regional aspects
- 6.4 Institutional arrangements
- 6.5 Long-term planning activities—regional aspects

7. International activities in support of regional meteorological and climate programmes

- 7.1 Y2K Workshop Report
- 7.2 Emergency Managers Weather Information Network (EMWIN)
- 7.3 Satellite Projects (QFax)
- 7.4 EU Cyclone Warning System Upgrade Project
- 7.5 RSMC activities, Fiji Meteorological Services
- 7.6 WMO activities—regional aspects
- 7.7 SPREP activities—regional aspects
- 7.8 Regional Climate Bulletin
- 7.9 Climate Data Resources for Environment and Sustainable Development (CDRESD)
- 7.10 US Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) Programme
- 7.11 Hydrology and Water Resources Programme—regional aspects
- 7.12 Second Technical Conference on Management of Meteorological and Hydrological Services in WMO RA V
- 7.13 International Decade for Natural Disaster Reduction (IDNDR)/South Pacific Natural Disaster Reduction Programme (SPNDRP)
- 7.14 South Pacific Applied Geoscience Commission (SOPAC)

8. Other matters

- 8.1 Preparations for the WMO Congress in 1999
- 8.2 Any other matters

9. Date and venue of the next meeting

10. Closure of the meeting

Annex 3: List of documents

Doc. No.	Title	Agenda Item	Submitted by
1	Provisional Agenda	(1)	SPREP Secretariat
2	Explanatory Memorandum relating to the Provisional Agenda	(1)	SPREP Secretariat
3	Fourth SPREP Meeting of RMSD, July 1997	(2)	SPREP Secretariat
4	WMO Regional Association V Meeting, Bali, Indonesia, September 1998	(2)	SPREP/WMO Secretariat
5	Regional Specialised Meteorological Centre (RSMC) Nadi, Fiji Meteorological Service	(3.1)	RSMC, Nadi
6	National Reports	(3.2)	NMSs
7	Climate Issues	(4.1)	SPREP Secretariat
8	National Reports	(4.2)	NMSs
9	Role and Operation of NMSs	(5.1)	Bureau of Meteorology, Australia (BOM)
10	International Data Exchange – Resolution 40 (Cg-XII)	(5.2)	WMO Secretariat
11	Education and Training – Regional Aspects	(5.3)	WMO Secretariat
12	Information and Public Affairs Programme – Regional Aspects	(5.4)	SPREP/WMO Secretariat
13	SPREP's Climate Change Programme	(6.1)	SPREP Secretariat
14	WMO Subregional Office for the South-West Pacific	(6.2)	SPREP/WMO Secretariat
15	Technical Cooperation Programme – Regional Aspects	(6.3)	SPREP/WMO
16	Institutional arrangements – Regional Aspects	(6.4)	SPREP/WMO
17	Long-term Planning Activities – Regional Aspects	(6.5)	SPREP/WMO Secretariat
18	Y2K Workshop Report	(7.1)	SPREP/WMO Secretariat
19	Emergency Managers Weather Information Network (EMWIN)	(7.2)	SPREP Secretariat
20	Satellite Projects (QFax)	(7.3)	SPREP Secretariat

Doc. No.	Title	Agenda Item	Submitted by
21	EU Cyclone Warning System Upgrade Project (CWSUP)	(7.4)	EU CWSUP
22	RSMC Activities, Fiji Meteorological Services	(7.5)	Fiji Meteorological Service, RSMC, Nadi
23	WMO Activities – Regional Aspects	(7.6)	WMO Secretariat
24	SPREP Activities – Regional Aspects	(7.7)	SPREP Secretariat
25	Meteorological Services	(7.7.1)	SPREP Secretariat
26	PICCAP	(7.7.2)	SPREP Secretariat
27	CCSLRMP	(7.7.3)	SPREP Secretariat
28	UNFCCC/COP 4 Preparation	(7.7.4)	SPREP Secretariat
29	SPREP Research Programmes	(7.7.5)	SPREP Secretariat
30	Regional Bulletin	(7.8)	SPREP Secretariat
31	Climate Data Resources for Environment and Sustainable Development (CDRESD)	(7.9)	SPREP Secretariat
32	US Department of Energy/ARM Proposal	(7.10)	Los Alamos National Laboratory/SPREP Secretariat
33	Hydrology and Water Resources Programme – Regional Aspects/ARM Proposal	(7.11)	SPREP Secretariat
34	Second Technical Conference on Management of Meteorological and Hydrological Services in RA V	(7.12)	WMO Secretariat
35	International Decade for Natural Disaster Reduction (IDNDR)/SPNDRP	(7.13)	INDR/SPNDRP
36	South Pacific Applied Geoscience Commission (SOPAC)	(7.14)	SOPAC
37	Preparations for Congress	(8)	SPREP/WMO Secretariat

Annex 4: Country reports

Following are the country reports made available to SPREP.

1. Australia

The highlights since the Fourth RMSD (July 1997) include:

- Significant enhancements in the Bureau of Meteorology's ability to monitor the location, development and movement of thunderstorms through the use of a remote sensing lightning detection system.

- Fifty new Automatic Weather Stations (AWS) installed across Australia, 11 of which contributed to extending the Reference Climate Station network for climate change detection.

- A Bureau scientist conferred with the WMO Twelfth Professor Vilho Vaisala Award for the development of a powerful and accurate technique to calibrate pyranometers which measure solar radiation. The technique halves the uncertainty in routine global solar radiation measurements and has been adopted as international standard practice.

- The commissioning of the Joint Bureau/CSIRO High Performance Computing and Communications Centre (HPCCC) based around an NEC SX-4 supercomputer.

- The Australian Integrated Forecast System recognised with a Government Technology Productivity Silver Award (a specially tailored Fiji AIFS was also installed in RSMC Nadi).

- An automated tropospheric wind profiler, capable of providing round-the-clock, remotely sensed vertical profiles of wind from the surface to 18 kilometres, commenced operational trial at Mt. Gambier.

- Autosondes, fully automated systems for taking upper-air observations, installed in the Cocos Islands and other locations.

- The Aerosondes, a small robotic aircraft for environmental monitoring, completed an intensive operational field trial near Port Hedland. Test missions in 1997 and 1998 included flights through the periphery of a tropical cyclone, severe thunderstorms and across the Atlantic.

- Significant improvement in the accuracy of tropical cyclone track forecasts over the data-sparse oceans demonstrated using high resolution satellite data, a new four-dimensional data assimilation technique, in conjunction with a 15-kilometre resolution model.

- Provision of smoke trajectory forecasts by RSMC Melbourne on Environmental Emergency response during the Indonesian forest fires.

- Major advance in warning capabilities resulted from the implementation of a storm surge model using synthetic winds from a representative tropical cyclone pattern.

- Introduction of the Australian Meteorological Data and Information Service System for improved access to the Bureau's data and products via the Internet.

- Establishment of an Asia–Pacific FRIEND (Flow Regimes from International Experimental and Network Data) network on hydrology and water resources.

- Computer Y2K compliance tests continuing.

- Implementation of a new Coupled General Circulation Model able to simulate climate changes with increasing greenhouse gas concentrations over the Australian continent, consistent with observed trends over the last century.

- Completion in 1997 of the four-year, AusAID-funded A$1.1m Pacific Meteorological Services Project (PMSP) which helped to upgrade significantly the quality of climatological data in developing countries in the South Pacific.

- Participation of Pacific island countries in the Fourth CLICOM Course, an Assistant Forecasters

Course and a Diploma in Meteorology Course at the Bureau of Meteorology Training Centre in Melbourne.

- First Advanced Climate Course, attended by New Zealand and Indonesia.

- Further development of the Climate Zone, an interactive system on the Intranet.

- Detailed climate information on Bureau Internet Homepage, including progress of El Niño. The National Climate Centre assisted a number of media programmes which focused on El Niño, including ABC's *Quantum*, a BBC special, a Victorian Farmers Federation broadcast and a school video.

- Continued to produce *Climate Monitoring Bulletin*, *Monthly Rainfall Review*, *Monthly Drought Review*, *Seasonal Climate Outlook* and *Tropical Diagnostic Statement*.

- Drafting of a prospectus and a poster to promote a comprehensive survey of the major climate fluctuations and episodes of the 20th century.

- Discussions under way to form an Australian consortium for participation in the International Research Institute for Climate Prediction.

2. Cook Islands

2.1 Introduction

The Cook Islands Meteorological Service (CIMS) used to be part of the Ministry of Tourism and Transport, as was reported at the Fourth SPREP Meeting of RMSD in 1997 in Apia, Samoa. I am happy to report that the CIMS has been part of the Ministry of Police since 1 July 1998.

As a result of the Cook Islands Government Reform in 1996, the original staff of 24 was reduced to 12. Two staff members have since then resigned and two were just recruited so as to maintain a manageable workload for staff. All staff members are based in Rarotonga, apart from one in Pukapuka where he performs synoptic reports and his observations are complemented with an Automatic Weather Station that does synoptic reports within the main synoptic hours.

The duties performed by staff are as follows: administration, management, technical, general observation network, seismology, upper-air radar, radiation monitoring, satellite receiving station and climatology.

2.2 Communication

Due to the high cost of the communications for the exchange of data with other Meteorological Services in the region and around the globe using the AFTN, the CIMS sought assistance from the World Weather Watch Programme and the Global Telecommunication System for an alternative way of exchanging this data. It was highly recommended that the use of Internet/email be investigated. Consequently, in the last week of August 1998, the AFTN came to a halt and was replaced with email as it was cost effective and more versatile. The only shortfall of this system was the non-real-time alert of Special Weather Bulletins and other emergency warnings such as the tsunami warnings.

The AWSs that were installed about two years ago as reported in the Fourth SPREP Meeting of RMSD have not been that successful due to the local communications agency not responding to the problem raised by the CIMS. Of the six AWSs installed, the Manihiki AWS was destroyed by Cyclone MARTIN on 1 November 1997, and the Pukapuka and Penrhyn AWSs have been unreliable as these systems can only be interrogated intermittently.

2.3 Operations

The CIMS performs two radar flights a day and releases 100 gm balloons at 2300 and 1100 UTC respectively so as to fulfil its obligation with WMO. A radar flight is also observed on the island of Penrhyn at 2300 UTC. This was part of the TOGA project that was supposed to end in the late 80s, but due to the confidence and the ingenuity of the technician on Penrhyn, this station has managed to continue to report crucial data in this sparse area both for forecasting, aviation and climatological purposes. CIMS also operates, or more accurately, is the caretaker of other projects such as South Pacific Super Plume Project (SPANET) by Japan, Geographic Positioning Satellite (GPS) by Japan and South Pacific Sea Level and Climate Change by Flinders University, South Australia.

These projects are agreed upon by the Cook Islands Government as part of the scientific community awareness in small island states as well as the visibility of the CIMS in extending to the international scientific community.

2.4 Human resources development

The CIMS took part in the following training programmes during the year that are all funded from outside sources:

- Capacity Building Workshop in Fiji—WMO;
- TCC and RA V session in Bali, Indonesia—WMO;
- Southern Hemisphere Tropical Cyclone Forecast in Melbourne—WMO;
- Public Weather Service Workshop—WMO; and
- Level I Pacific Islands Training in Fiji—WMO.

This is the first time that the Cook Islands has taken part in the last programme as previously the need for training was met by senior staff in the service and the service had the capability to do such training. Due to the above-mentioned CI Government Reform, some of these capabilities were lost and the workload of each staff member was increased, thus reducing the time available for staff to take part in national training programmes.

2.5 Proposals

The CIMS is looking forward to proposing several agencies as well as becoming signatory to the following international agreements: World Area Forecast System through WMO and Comprehensive Nuclear Test Ban Treaty through the United Nations. CIMS is also planning media presentations on television and radio.

Some of the proposals have to be aligned with other agencies in the country like the National Disaster Management Committee, the Ministry of Foreign Affairs and the Environment Service so as to implement these projects.

2.6 Conclusion

The CIMS has seen a lot of changes since the Fourth SPREP Meeting of RMSD and with the implementation of other projects, in addition to the current responsibilities, the CIMS would like to fulfil its obligations and its mission as required by the Cook Islands Government as well as the regional and international agencies to which the Cook Islands belong.

3. Federated States of Micronesia

3.1 Operations

The Weather Service Office operations have been generally satisfactory since my last report in July, 1997.

Twenty-four hourly aviation weather reports with six-hourly synoptic reports by MAPSO and two upper-air soundings at 00Z and 12Z with MicroART systems at three weather service offices have been successfully conducted. All observational data are archived and copies mailed each month to NCDC Asheville, North Carolina, USA, for quality control and archiving. As of September 1998, all weather service offices in Micronesia have sent the end-of-month archived climatological summary data by email. For this rapid email system the NOAA National Climate Data Centre (NCDC) is able to provide each Local Climate Data (LCD) summary in the NCDC Web pages and LCD summary publications within a few days. Normally LCD publications are prepared by NCDC and mailed to Meteorological Service Office after two months.

The AFTN/MET communications have been operational. All daily forecasts and warnings are received via AFTN/MET circuit from WSFO Guam and Honolulu for the local weather forecast adaptation to the general public.

The QFax has been very helpful for receiving satellite images, weather charts and products for public weather forecasting. The Internet is also used as back up for the AFTN/MET system. There were two CMAN automatic stations in the outer islands which were converted to manual systems to improve the quality of weather data transmission to the forecast offices.

The updated software versions for the MAPSO and MicroART computers have been installed to improve the quality of observation and compliance with Y2K requirements. A new software version for the climate database will be used by the US affiliated Meteorological Service Offices in Micronesia in the near future to maintain the climate database. The old climate data will be transferred automatically from the CD-ROM of our office computers.

I am very pleased to inform this meeting that the FSM Weather Service Offices' and other US-affiliated Micronesian weather service offices' operational funding will continue until the termination of the Compact of Free Association term, which will end in the year 2001. A Joint Committee on Compact Funding Renegotiation has been appointed by the FSM and US governments; the first negotiation was

completed in March 1999. The renegotiation will include WSOs' operation funds after the termination of compact in the year 2001.

3.2 Facilities and equipment

The NOAA National Weather Service Headquarters, Honolulu, has funded construction for a new WSO Yap office structure that will replace the old WSO. The construction will commence as soon as the land matter is settled.

All WSOs have received 35 kW Onan Standby generators which are operational. A survey of hydrogen generators was conducted by the NOAA Weather Service Headquarters, USA—mainland and Honolulu—to determine the future use of production of gas for the upper-air sounding of balloons. The new replacement hydrogen generators are scheduled to be procured and shipped to each Micronesian WSO next year.

3.3 Communication

As mentioned earlier the AFTN/MET communication system is the primary communication system for the transmission and receipt of weather data and forecast products. However, marine fax, Internet, QFax and HF Packrat can be used when the primary Comm system is not in operation. The WSO Pohnpei was selected for the PeaceSAT system pilot study for about a year, and the system occasionally failed due to conflicts with locally dedicated phone lines, satellite phasing problems and satellite black-outs. However, we hope to continue to work with the University of Hawaii PeaceSAT staff on this experimental project since this is a free-of-charge system. This office is requesting WMO and SPREP to install the EMWIN programme in Pohnpei and other weather offices in the FSM.

On behalf of the FSM Government, I would like to take this opportunity to extend our appreciation to the Australian Bureau of Meteorology for funding the QFax and GPS systems which were made available by WMO and SPREP through the VCP. Also thanks to Mr Colin Schulz for installing the QFax system and training the staff. Mr Schulz's continuous support and updating of the operation of the QFax system is very much appreciated.

3.4 Meetings and workshops

FSM Government and Weather Service Office staff have participated in the following meetings and workshops:

- IPCC meetings—FSM Climate Coordinator, John Mooteb, and Patrick Mackenzie;
- Climate Change Conference in New Caledonia—Robert Hadley;
- Meteorological Service Directors on Capacity Building in the Area of Management—Suzuki and Kapelle;
- Typhoon workshop for government and WSO staff—WSO and Emergency Management staff;
- SPREP/NTF workshop training on South Pacific Sea Level and Climate Change at Adelaide, Australia—WSO staff;
- Typhoon Committee Meeting in Bali, Indonesia; and
- PICCAP meeting in Suva, Fiji and FSM—John Mooteb and WSO staff.

3.5 Other information

I am very happy to report that the first Micronesian to achieve a BSc Degree in meteorology, from the University of Hawaii, is Mr David Aranug, in July 1998. Currently, he is receiving a forecaster internship training at the WSFO Guam, and upon completion he will be assigned to WSO Yap, which is his home state. We are expecting another meteorology trainee, Caesar Hadley, to complete his BSc requirements, also at the University of Hawaii, by the end of this school year, May 1999. He will then be assigned to the WSO Pohnpei.

FSM WSO staff had been actively involved in the El Niño forecast of severe drought to our country and had provided advance weather information to the officials for the preparation for drought. Thanks to ENSO Application Centre from the University of Hawaii and Guam staff for their timely and very accurate forecast of rainfall data, which the FSM Government had used as the primary source for making decisions on emergency policies and funding assistance to the general public for preparation for the drought. Additional thanks to the WMO and other organisations for the El Niño press releases and prediction information that were sent to our offices and were relayed to the general public.

The FSM Government restructuring of the FSM Weather Service Office is nearly completed. The government has cut the workforce by about 40 per cent by abolishing some departments and merging others. The early retirement policy was implemented. In the new organisation, the FSM Weather Service Office has been placed directly under the management of the office of the Vice President. The

NOAA National Weather Service and FSM Government are in the process of rewriting the existing MOU due to changes in the management.

The FSM Government had hosted the Twenty-ninth South Pacific Islands Forum in August, 1998. During this period, our office staff had provided the necessary materials and assistance to SPREP and NTF representatives for their presentations to the Forum members.

The FSM Government wishes to express its profound appreciation to WMO/SPREP for arranging this meeting, and to the US NOAA NWS and other countries and agencies for funding this important meeting. Thank you for your patience.

4. Kiribati

4.1 Introduction

Meteorology and climatology are strongly related so it is a bit difficult to differentiate the two disciplines. However, I will try.

4.2 Overview of the Kiribati meteorological programme

4.2.1 Responsibilities and roles

- To provide weather information to the general public, aviation and maritime communities for their safety and economic benefit.
- To ensure the accumulation of climatic data through the processing of surface and upper-air programme activities.
- To cooperate with other climate research organisations in climate data acquisition activities in Kiribati.

4.2.2 Reporting station network

There are eight synoptic reporting stations under the Kiribati Meteorological Service (KMS). These stations are: 91487, 91490, 91533, 91601, 91610, 91623, 91629, and 91701. Number 91610 also does the upper-air observation programme. The NOAA upper-air station on Christmas Island in East Kiribati is not administered by KMS.

The station is operated privately and this had caused some confusion since the government did not know about the arrangements for its operation. These matters are yet to be sorted out.

These stations send six-hourly synops to Tarawa (91610) which then distributes the collected reports to Nadi for forecasting purposes including the following: Terminal Aerodrome Forecasts (TAFs), Area forecasts, Marine forecasts, Warning and Alert and Route forecasts (ROFOR).

4.2.3 Communication network internal communication

Communication facilities internally are mainly telephone and fax on Tarawa, and just recently email. High Frequency radios are used to collect synops from outer islands using the following licensed frequencies as KMS working frequencies only: 5.015.0, 7.325 and 14.370.0 MHz. However, these frequencies depend largely on the propagation or skip being able to establish good communication or contact to the outer subs, especially the distant Line and Phoenix stations—91487, 91490, and 91701—during daytime hours.

There is a fax machine in the Line Islands belonging to the Aviation Division which is being used to transmit metar reports direct to Honolulu Weather Office during Aloha flight days. However, the observers had been briefed to have these reports sent to Nadi Forecasting Office as well.

4.2.4 External communication

External communication is by fax machine, email and telephone. Since recently, all meteorological traffic is now being transmitted outward on the email system. The QFax and EMWIN systems are fully operational and have been proved to be of significant benefit to the meteorological service in Kiribati. The EMWIN system has made it possible for us to receive weather bulletins on a regular basis.

Our difficulty with sending the weather bulletin on regular basis through the AFTN terminal 1 kilometre away in the past is now solved by the EMWIN system.

4.3 Climate programme

KMS is coordinating and administering the following climate research activities:

- NOAA upper and profiles;
- NTF tide gauge;
- UH tide gauges in the Line and Phoenix group;
- Ozone monitoring devices SAOZ and NIWA experiments; and
- DSIR experiments.

In addition to the above, KMS expects to have ARMS project and Japanese seismology experiments in the years ahead.

As it is the intention to have all climate acquisition programmes centralised and coordinated by the Meteorological Division in Kiribati, it is vital that international organisations contact KMS for assistance.

4.3.1 Meteorological Division Kiribati climate activities

As mentioned earlier, climate data accumulate through the processes of surface and upper-air observation programmes.

4.3.2 Climate databank

The CLICOM computer archives all climate data for Tarawa and the rest of the stations. At the end of each month the stations send climatological returns to Tarawa for archiving climate data in the CLICOM computer. Copies of these returns are also disseminated to the National Institute of Water and Atmospheric Research (NIWA) monthly. This process ensures that permanent storage is guaranteed.

4.3.3 Issues and constraints

Since the start of the meteorological programme there has been no problem with site exposure. Now, however, developments mainly by island councils are encroaching on the observing sites, resulting in poor, possibly deteriorating, exposure. KMS is prioritising relocation of these sites to better spots preferably near the aerodrome.

It was a big mistake to locate the observing sites elsewhere than in the aerodrome area but probably this was due to the absence of airstrips in the past on the outer islands. (If these observation sites are relocated soon, the climate data records accrued from them could be superior.)

Due to political and economic obstacles, KMS cannot relocate these sites unless the Kiribati Government prioritises climate as an urgent issue. Since relocating seven observing sites at once will require a substantial amount of money, it will never become a reality unless somebody assists KMS.

5. New Zealand

The following is a brief report on New Zealand climate activities.

5.1 Part 1: Climatological

No significant changes to policy or operations in respect of climate services have occurred since the last meeting. The National Cooperative Climate Network and National Climate Database continue to gather and archive data. A major feature of the year has been the number of significant weather and climate anomalies and the associated media and public interest. Contributions were made to a number of important international activities, several being of interest to the Pacific islands.

NIWA continues to emphasise that New Zealand's climate network and database are cooperative activities that depend on inputs by other groups (e.g. Meteorological Service of New Zealand Ltd is a major contributor), and that NIWA's role is to facilitate the maintenance of a quality network and database for all users, including the provision of good data access. Among other things, work is well progressed on providing direct World Wide Web access to the database.

The 1997–1998 El Niño had an impact on New Zealand. Serious drought occurred in most east coast regions and cost the country an estimated NZ$1 billion from lost agricultural production. Climate forecasts from NIWA and Meteorological Service of New Zealand Ltd helped industries respond and reduce their losses. However, a Royal Society workshop on the event, organised by Reid Basher, concluded that a more systematic approach for the generation, dissemination and application of climate information was needed.

Dr Basher has been invited to provide an assessment of the 1997–1998 El Niño and its impacts on Australia, Papua New Guinea, New Zealand at the UN-sponsored International Seminar on the El Niño in Guayaquil, Ecuador, this week. The aim is similar to that of the Royal Society meeting—to learn how to better handle future El Niño events. Dr Basher will also summarise the impacts on the South Pacific islands as Penehuro Lefale could not attend the meeting. A prime conclusion will be that the Pacific islands are heavily affected by El Niños and need to establish a regional system for climate assessment, prediction and application.

Towards this end, in October Dr Basher assisted SPREP to draft an application to the Asia–Pacific Network (APN) for funding to implement the proposed Fiji-based climate surveillance and prediction scheme.

NIWA announced in July 1998 that there had been a 'shift' in New Zealand's climate, centred about 1977 and related to a decadal oscillation on the Pacific basin, on top of generally rising temperatures. There have been more westerly winds across New Zealand,

accentuating the east–west rainfall pattern. The study also showed a shift in the South Pacific Convergence Zone, probably related to the greater number of El Niños over this period.

The occurrence of many extreme weather and climate events over the past year (the drought, a very hot February, very wet July and October with flooding) resulted in unprecedented public and media interest and many interviews with meteorologists and climate scientists.

Meteorological Service of New Zealand Ltd hosted several international meetings in February, including the first meeting of the RA V Working Group on Climate Matters. This was chaired by Dr Don Thompson and involved several Pacific island representatives.

The Intergovernmental Panel on Climate Change (IPCC) Special Report on the Regional Impacts of Climate Change was released early in 1998. Several scientists from the region contributed, including Dr Basher who wrote the chapter on Australasia. The preparation of the IPCC Third Assessment Report has started, also involving Dr Basher and other climate scientists from NIWA.

The El Niño-based seasonal forecast for the South Pacific islands issued by Dr Basher on 27 November 1997 predicted more cyclones and higher risks in the eastern areas of the region. This proved to be quite accurate (a record 17 cyclones). A La Niña-based seasonal forecast for the coming season was issued on 16 October 1998. This predicts high activity in the western areas.

As Chair of the WMO Commission on Climatology (CCL) Working Group on Climate data, Dr Basher has assisted WMO in recommending New Zealand and Pacific island stations for the Global Climate Observing System (GCOS) Surface Network and in dealing with other climate data issues. PICs are encouraged to contribute to the GCOS Surface Network and to take note of the December 1997 Kyoto Framework Convention on Climate Change (FCCC) Meeting call for all countries to properly support the climate networks and databases required to monitor climate and support climate applications.

5.2 Part 2: New contribution in the Pacific

5.2.1 Objectives

- To advise and assist Meteorological Services through new and relevant management techniques.
- To improve quality and integrity of meteorological data in the region.
- To ensure data networks are matched to countries' needs and resources (financial and technical)
- To work in close collaboration with other regional and global organisations i.e. WMO, SPREP, United Nations Office for the Coordination of Human Affairs (UN/OCHA) and International Decade for Natural Disaster Reduction (IDNDR).

Total Funding (Voluntary Cooperation Programme—VCP) in excess of NZ$1 million per year.

5.2.2 Present involvement

Kiribati: Direct Meteorological Service of New Zealand Ltd funding. Management of WWW funds for U/A. Technical support.

Tuvalu: NZODA funded Project. Direct Meteorological Service of New Zealand Ltd funding. Management of WWW funds for U/A. Technical support.

Tokelau: Proposal for NZODA project under action. Existing NZODA funds for technical and management support.

Cook Is: NZODA project for organisational and technical development.

Fiji: Long history. NZODA project for management, technical and staffing assistance. Recently completed review.

Niue: NZODA project for management and technical assistance.

Tonga: Direct Meteorological Service of New Zealand Ltd funding for miscellaneous support and advice as requested.

Pitcairn: Direct Meteorological Service of New Zealand Ltd funding for miscellaneous support and advice as requested. Automatic Weather Service (AWS) Project on behalf of Bureau of Meteorology (BOM) currently in progress.

Steve Ready, Chairman of RA V Tropical Cyclone Committee for the South Pacific (TCCSP).

Meteorological Service of New Zealand Ltd staff hold other senior positions on WMO/Civil Aviation Office (CAO) Committee/Working Groups.

Wellington is a Regional Forecasting Centre (RFC) and Volcanic Ash Advisory Centre.

5.3 Part 3: Meteorological Service of New Zealand Ltd activity in the last year

- The major meteorological event of the year was El Niño. This was well communicated by an active communications programme, publication of seasonal outlooks, and through television. We believe that we benefit from a weather-literate community, and that our programme of speaking engagements, news releases about significant weather events, and participation at marine and agricultural exhibitions is helpful in demystifying meteorology, and promoting understanding of the value and limitations of weather forecasts. These also provide an opportunity to promote and demonstrate additional services such as MetFax and WeatherNow, as well as to obtain useful feedback from our customers. During the year we spoke directly to over 15,000 people about weather forecasting, gave over 800 interviews to the media, answered over 1,000 phone and mail queries, and demonstrated our services at six boat, agricultural, and pastoral shows.

- Close attention is paid to forecast verification in order to ensure that a high level of skill is maintained. Verifications of warnings of heavy rain, snow, and severe gales showed that this year, we again exceeded performance targets. The El Niño conditions did help predictability, particularly for heavy rainfall, which will be hard to repeat in a La Niña year. Our annual survey of regional councils, for whom Severe Weather Bulletins are of vital importance, revealed high satisfaction with the accuracy, timeliness and helpfulness of the warnings service.

- New Zealand is a member of WMO, along with 184 other countries, and Meteorological Service of New Zealand Ltd's contract with the Minister of Transport requires me to act as New Zealand's Permanent Representative with WMO. In addition to dealing with operational meteorology, the role involves coordination of communications and representation on climate and hydrological matters, and I appreciate the support and participation of the many individuals and institutions involved over the last year.

- One of the significant issues facing WMO is the free international exchange of data. There are no restrictions placed on access to and use of data Meteorological Service of New Zealand Ltd collects to produce the forecasts and warnings service specified in the contract with the Minister of Transport. Data, forecasts, and current warnings can be reviewed on Meteorological Service of New Zealand Ltd's Web site, http://www.met.co.nz./

- In February, Meteorological Service of New Zealand Ltd was pleased to host four WMO meetings in Wellington including: one on the Internet and its ramifications for WMO; another on the structure of the Commission for Basic Systems; a WMO Region V (South-West Pacific) meeting on the implementation of the World Weather Watch Programme in the Pacific; and a WMO Region V meeting on climate matters. These meetings also provided participants from several countries with the opportunity to see that this commercially based meteorological service is committed to the objectives of the WMO.

- Our experience in operating a meteorological service commercially is being recognised internationally, and during the year we provided consultancy advice on meteorological service structure and operations on three continents—Africa, Asia, and Oceania.

- We continued to provide professional support to the Fiji Meteorological Service, funded through a management services contract with the New Zealand Ministry of Foreign Affairs and Trade. Additionally, this year Meteorological Service of New Zealand Ltd and the Australian Bureau of Meteorology were subcontractors in a Japanese-funded project to upgrade the Regional Specialised Meteorological Centre in Fiji. We installed hardware and forecasting software to complement the Australian systems. These are both good examples of international collaboration in capacity building.

- Meteorological Service of New Zealand Ltd is now structured to provide services to the private sector worldwide through its Metro identity and subsidiary company, Metro Information Limited, so keeping these separate from its services for government and government agencies. This eliminates any confusion internationally with sovereign national weather services, and provides a vehicle for marketing products without meteorological content, whilst applying core competencies developed for the attractive presentation and delivery of near real-time information.

On behalf of the Board of Directors, I have pleasure in reporting that the Meteorological Service of New Zealand Ltd celebrated its sixth anniversary on 30 June 1998 with a record after-tax profit for the sixth successive year. This year's net profit after taxation

of NZ$3.59 million, slightly above last year's result of NZ$3.56 million, is a pleasing result in view of the increasingly competitive market for meteorological and information presentation services. Revenues increased from NZ$23.4 million last year to NZ$23.6 million, with increased contributions from the media, industry, consultancies and 0900 services.

6. Niue

The Niue Meteorological Service was relocated to a new office at Hannan Airport and has been operating as a part corporation since 1 July 1998, after 92 years under the umbrella of telecommunications.

The current staff comprises three permanent meteorological—a manager, forecaster and meteorological officer—and two temporary contract staff to work under the Climate Change Project for a period of two years ending December 1999.

Currently the stations in Niue include two synops, three climate and one rainfall. Proposals to add two rainfall stations unfortunately have been delayed due to financial difficulties.

Apart from the basic observing instruments, there is an automatic weather station (AWS) and QFax (low resolution receiving equipment).

Email and facsimile is our main communication for exchanging meteorological information in the region. Alternative backup is telex, often located in the Telecommunications Office.

There is a VHF radio for relaying of weather forecasts and cyclone warnings to yachts and ships in port or within Niue waters.

Technical assistance is provided by Meteorological Service of New Zealand Ltd under the NZODA project and this will continue on until the year 2001. Annual visits are held.

Trainings attended by Niue between July 1997 and October 1998 are listed below:

- Public Weather Service (Nadi, September 1997);
- Attachment Training at Flinders University in Adelaide (October 1997, April and October 1998);
- CLICOM Course (Melbourne, November to December 1997);
- Capacity Building Workshop (Nadi, April 1998);
- WMO Class II Assistant and Forecast Course (Melbourne, February to September 1998);
- Tropical Cyclone Forecast Course (Melbourne, October 1998); and
- Public Weather Service (Melbourne, October 1998).

Niue is seeking external financial assistance for a member of staff to study for a science degree, and later train as a WMO Class I meteorologist and do attachment training to the Regional Specialised Meteorological Centre (RSMC) in Nadi, Fiji.

The CLICOM computer has updated climate data entries for all stations in Niue.

Early this year the Niue Government officially approved the Niue Climate Change Project to be implemented under the Niue Meteorological Service for a period of two years ending in December 1999. The project was launched from 9 to 11 March 1998, followed by a workshop on National Climate Change Enabling Activities. Consultants from SPREP, UNEP, the National Tidal Facility and the University of Yokohama arrived in Niue and conducted the workshop at the request of the Niue Government.

Cabinet selected the National Committee consisting of government employees and non-government representatives, a project management committee and six working committees. The six committee groups are Greenhouse Inventory, Vulnerability and Adaptation, Mitigation, Capacity Building, Education Training and Awareness and National Communication.

The Education, Training and Awareness Committee was headed by the Manager of Niue Meteorological Service. Activities carried out were as follows:

- village meetings;
- talent quest;
- Niue Primary School—Awareness Day;
- Niue High School—Awareness Day;
- Niue Primary School—poster competition;
- TV and radio programmes;
- provision of billboards; and
- invitations to both schools and general public to visit and observe the work of the National Meteorological Service.

Finally, I would like to acknowledge the following meteorological services, regional and international organisations for providing financial assistance for

Niue to participate in courses, workshops, meetings and for providing equipment: New Zealand Meteorological Service, NZODA, Australia's Bureau of Meteorology, AusAID, International Decade for Natural Disaster Reduction (IDNDR), SPREP, US National Weather Service, NOAA and WMO.

7. Palau

7.1 Introduction

Mr Chairman, fellow Directors, ladies and gentlemen.

I bring greetings from the Republic of Palau. Ladies and gentlemen, let me touch briefly on the history of the Palau Weather Service.

In 1947, the US Navy set up the Palau Weather Station, then turned it over, in 1951, to the civilian authority of the US Weather Bureau which recently became the US Weather Service. Direct management continued until 1973 when the Officer in Charge post was localised. As a result of the long-standing policy to train Micronesians in weather service operations, we have had, since 1982, a fully Palauan staff. At present we have one fully equipped weather service office in Palau.

The weather service programme comprises two main areas of weather observations:

- *The surface programme* is made up of hourly, six-hourly and/or daily observation of various elements. There are four cooperative stations under the supervision of our first-order station, three providing monthly reports of temperature and rainfall and the fourth, a marine station in Koyangel Atoll, producing two daily observations of sky condition, visibility, wind direction and speed, state of seas, temperatures and tide.

- *The upper-air programme* is radiosonde observation. Radiosonde observation provides temperature, relative humidity, wind direction and speed and pressure.

The weather service provides the daily weather forecast twice a day to the general public through phone patch to three FM radio broadcasting stations. At the same time, we update the weather forecast over the station code-a-phone (automatic telephone). The NWS Forecast Office in Guam has improved and expanded the Micronesian Coastal Zone Forecast, FZPQ50 PGUM bulletin, at 0600Z and 1800Z for our adaptive local weather forecast.

Palau Weather Service also contributes to and assists with other scientific programmes on Palau:

- University of Hawaii Tide Gauge. The University of Hawaii has operated a tide gauge at the Fisheries wharf for many years. This project is funded through the University but some maintenance and daily monitoring is provided by weather service staff.

- National Oceanic Survey Tide Monitoring Project. The National Oceanic Survey has operated a tide monitoring system at the Fisheries wharf for many years. The system is linked via satellite, all data are transmitted direct to the Pacific Tsunami Warning Centre (PTWC) in Hawaii. This project is funded by US National Oceanic Survey.

During the 1997–1998 El Niño event, we developed a public information campaign and advised our citizens on what to expect in the way of water shortages and the increased risk of illness associated with the drought. Our water utility developed a conservation plan and we were able to plan for the distribution of drinking water. With this public awareness, Palau did not face water shortages during the El Niño event.

7.2 Prediction for fourth quarter 1998

Palau can expect near normal to above normal rainfall for the next year. Rainfall at Koror in July and August was 7.52 inches (42 per cent) and 10.16 inches (68 per cent). In September and October values rose to 10.09 inches (85 per cent) and 19.05 inches (137 per cent), as upper-level low pressure areas associated with the Tropical Upper Tropospheric Trough (TUTT) brought disturbances that stagnated over the Palau area. This resulted in above normal rainfall, despite the lack of an active monsoon over the region. However, further south in Peleliu, conditions were drier. July to September rainfall there averaged little over 7 inches or slightly less than 50 per cent of normal. In October, rainfall at Peleliu rose to 14.98 inches (108 per cent) with some effects of the TUTT-induced rains. Rainfall for Koror should be slightly above normal until January, then near normal thereafter. More southern islands should be slightly drier than normal until March, then near normal thereafter. Palau could experience a tropical cyclone from now until mid-December and in the fall of 1999.

The expected rainfall for Palau over the next 12 months is as follows:

Inclusion period	*% of long-term average*		
	Koror and Mountain %	*Outer Atolls*	
		N. of 8° N	S. of 8° N
July–Sept. '98	65%	605%	49%
Oct.–Dec. '98	115%	115%	100%
Jan.–March '99	100%	95%	80%
April–Dec. '99	100%	100%	100%

Palau Weather Service has no meteorologist currently on station but, with the implementation of the compact of free association with the United States, Palau became eligible to participate in the Micronesian Meteorologist Training Programme. Under a cost-sharing agreement with the US National Weather Service, the programme provides training leading to a bachelor's degree in meteorology from the University of Hawaii. Palau's meteorologist candidate, Ms Maria Ngemaes, is currently enrolled at the University of Hawaii. She is on her fourth year under the programme. On completion of her training, Ms Ngemaes is expected to return to Palau to serve as Meteorologist-in-charge of the Palau National Service.

8. Papua New Guinea

Thank you to the sponsors of this meeting (WMO, US NOAA NWS, US DOE ARM program, BOM/ AusAID, SPREP and Meteorological Service of New Zealand Ltd) for funding my attendance, especially DOE ARM program. It has been a great privilege to be here.

Following are some of the activities completed or begun since the Fourth SPREP Meeting of RMSD.

- Climate matters/climate change issues: I would like to acknowledge funding assistance from AusAID for a few of my officers to travel to Australia (Flinders University, SA) for training/ workshops.

- EU TCSWUP: We are grateful for the procurement and installation of the GTS upgrade to the communication system linking Port Moresby–Melbourne; and for training attachments to Solomon Islands Meteorological Service and to Fiji by our forecasters and assistant weather forecasters.

- Future activities would include the installation of the AWS system on Woodlark Island.

- Satellite receiving system (QFax): This project has been completed thanks to AusAID and BOM through WMO and SPREP.

- EMWIN has yet to be installed due to the location of the country far to the west and from GOES West satellite.

- BALUS project (Civil Aviation Authority wef 01/01/99): As PNG NWS is a division of the Office of Civil Aviation in PNG, we are to be included as a business unit in CA. The BALUS component will include a Needs Analysis of NWS during the first six months of 1999 and if the indication is unfavourable, PNG NWS will be transferred to a different department.

- Upper-air observation: Only visual wind flight observations are performed in Port Moresby, whereas Manus, with assistance from the ARM program, has been doing upper-air sounding using GPS sondes once a day. The Digicora upgrade has yet to be done through BOM/AusAID, probably in 1999.

- ARM: PNG NWS is pleased and indebted to the US Government for the support of the ARM program in Manus in providing observations. More important globally is that valuable data is being collected to improve climate models. PNG NWS has taken steps to ensure that observations and operations are not interrupted through negligence.

- RSMC Nadi TCC and WMO: Thank you to WMO for funding the attachment of one of our officers to RSMC Nadi TCC and to FMS for the training and excellent exposure at the venue. We recommend that this type of assistance be continued.

- Radar Observations: Our WF44 (weather radar) has been decommissioned since 1993 and there are no radar observations to date. Our project proposal for two weather radars (one for Port Moresby and one for Misima) to be funded through AusAID has been approved.

Thank you.

9. Samoa

9.1 Introduction

The Meteorology Division, although struggling to secure a reasonable portion of the National Budget and competing for resources, the bulk of which are allotted to infrastructure, health and education, has managed this year to significantly achieve some of the goals as prescribed by government.

The major objective of the Meteorology Division is to warn the community about impending disasters such as tropical cyclones, earthquakes, tsunamis and floods, and to provide services in geoscience and hydrology in the best interest of the public.

Restructuring was carried out in 1996 to include the Forecasting Unit, coupled with an intensive training programme to improve the operational capability of the Meteorology Services section.

The once defunct Climate subsection was re-established with clearly defined functions and new operational procedures. This change enabled staff to complete tasks within a specified time frame.

Institutional support includes:

- EU-CWSUP Project—Pentium computer with internet and email facility;
- US-NOAA National Weather Services—two 486 computers for data entry/processing; and
- WMO—three Pentiums for the CLICOM project—one computer is used in the Forecasting unit.

9.2 Meteorology

9.2.1 Automatic Weather Stations (AWS)

The network of AWSs that was procured and installed by the US Government through the NOAA National Weather Service, Honolulu has provided additional information to assist in the preparation of local weather forecasts. We are grateful for the continued support and maintenance of these AWSs by personnel of the Hawaii National Weather Services which has eased the burden on Samoa's National Meteorological Service.

9.2.2 Telecommunications upgrade

A high speed and a more reliable telecommunications link between the Samoa National Meteorological Service and the outside world is now being investigated. A better telecommunications link needs to be put in place to replace the slow speed and unreliable AFTN link to Nadi. With the assistance of SPREP, a consultant was recruited to investigate and report on the situation. In his report, he recommended upgrading the GRIB data linkage between American Samoa and Samoa to 33 kbps and a 2400 bps both way AFTN/MET at the Meteorological Office and the international airport. Implementation of the project is expected to begin in March 1999 with funding from the European Union Tropical Cyclone Warning System Upgrade and the United States National Weather Services and Federal Aviation Authority.

9.2.3 Tropical cyclone warning coordination

Because of the geographical proximity between Samoa and American Samoa, access to media information is virtually limitless. Recently, public confusion arose as a result of different warning messages issued by the American Samoa Weather Office and Samoa National Meteorological Service. There is a need for coordination to alleviate this problem.

After a series of meetings between the two services an operation document, titled 'New Procedures for Issuance of Tropical Cyclone Warnings' was produced. Both Meteorological Services have agreed to use the guideline document during the next TC season. Both communities were well informed of the change through Awareness workshops held in both countries.

9.2.4 Climate activities

A Server Pentium Computer, a contribution of WMO through the Voluntary Cooperation Programme (VCP) greatly assisted the Climate subsection in its work. Clientele increased threefold compared to the previous year. The two units established include: Design and Maintenance; and Analysis and Reporting.

9.2.5 Warning and Forecasting Centre

Samoa's Meteorological Services' proposal to become a National Forecasting Centre was accepted at the Fifth Session of WMO Regional Association in Bali, Indonesia and activities are to start in consultation with the RSMC in Nadi, Fiji.

9.3 Geophysics

9.3.1 Sea Level and Climate Monitoring Project

There will be continued Australian funding of tide gauge (SEAFRAME) operation and maintenance until the year 2000. There are problems with the real-time display in the office which desperately needs replacement.

9.3.2 Seismology

The Samoa Observatory serves as the primary station, being part of the International Seismograph Worldwide Stations Network (ISSWN) for continuous monitoring of tremors and earthquakes in the Pacific region, in addition to its role as the national contact point for the Pacific Tsunami Warning Centre.

Samoa Seismology Division recently joined the preparatory Commission for Comprehensive Nuclear Test Ban Treaty Organization (CTBTO) with headquarters in Austria.

9.3.3 Geomagnetism

Apart from New Zealand, the Samoa Intermagnetic Monitoring Station (IMS) is the only IMS operating in the Pacific region. The primary function is measuring the magnetic variations of the H, Z and D components of the Earth's magnetic field.

9.4 Hydrology

9.4.1 Hydrological data

The section was established in 1971 to collect hydrological data needed for undertaking the feasibility studies of the hydropower schemes in areas which have the potential, and to assist with design of the waterworks data from low flows and floods.

In the meantime, the network consists of five water-level gauging stations and nine rainfall stations. Note that the future monitoring capability of these stations cannot be guaranteed because of inadequate funding for maintenance purposes.

The Water and Sanitation Project of the South Pacific Applied Geoscience Commission (SOPAC) has provided the section with some of the flow equipment and assisted with the upgrading of the hydrological database.

9.5 Geology

9.5.1 Geotechnical investigations

The Geological Division of the Samoa Observatory is responsible for the provision of geotechnical drilling services and mechanical engineering support for the Ministry's fleet.

9.5.2 Human resources development

Short-term courses offered by WMO are supported by some countries. Meteorological Services have contributed significantly to their human resources development. Two members of staff graduated with WMO Class II from the Assistant Forecasters Course in the Australian Bureau of Meteorology in Melbourne and one meteorology technician attended the Basic Meteorology Observer Course (WMO Class IV) in Nadi, Fiji. The course was funded by WMO and the Government of Fiji.

With the proposed extension of offices (prefectural level), a training programme is now in place to develop the capability of staff to attend those stations.

In-service training of staff this year includes participation of staff at the Tropical Cyclone Conference in China (funded by EU CWSUP), in-country training by an expert meteorologist and disaster-related training.

9.5.3 Regional

At the SOPAC Annual Session the Japanese project TRITON funded by JAMSTEC is of interest to meteorologists, especially for meteorological information from data-sparse areas. Deployment of buoys in the South-West Pacific area transmission of data by the GMS satellite is possible, project to commence next year.

9.6 Conclusion

The highlight of the year is the enhanced forecasting capability of the service in being able to issue weather forecasts for the country with assistance from other centres.

It is also worthwhile mentioning the efforts of others in this achievement: SPREP, American Samoa NWS, Honolulu NWS/HRC, RSMC Nadi and all my colleagues in the Meteorology Services of the region.

Furthermore, I acknowledge with appreciation the WMO and SPREP's efforts in facilitating the agreement for the establishment of the subregional office in Apia.

10. Solomon Islands

This is a summary of the activities that have taken place, difficulties encountered and responses taken.

The roles, objectives and functions of the Solomon Islands Meteorological Service (SIMS) are carried out and fulfilled by the following sections.

10.1 Observations Section

The SIMS has been trying as in the past to expand its surface and upper-air observation network through the Development Projects of the National

Government but not with much success, the main reason being that the government is experiencing financial difficulties, which makes it quite hard to fund meteorological projects.

The Bougainville crisis resulted in one of the manned synoptic observing stations being closed for about a year: it has now reopened. Normal observations and transmission of data have started.

With regard to upper-air observations, there have been no balloon flights since early 1997. This is due to the financial crisis that the government is experiencing and the devaluation of the local currency in 1997. The Omega Navigation System has been phased out and has been replaced by the Global Positioning System (GPS). The new system was funded by Australia through the VCP of WMO. However, this has yet to become operational due to some problems encountered during installation, and spares have been ordered.

Although the Tidal Monitoring Gauge under the Climate Change and Sea Level Rise Monitoring Project had not been functioning well since June/ July 1998, the problem has now been fixed by a technician from National Tidal Facility of Flinders University of South Australia.

The AFTN system is currently in the Flight Service Building, however, the system will be replaced in the future. This will affect the Meteorological Service.

10.2 Forecasting Section

This is a newly established unit since 1996. SIMS has five trained forecasters but early this year the fifth member of staff left the service. The unit has expanded its services by providing domestic aerodrome forecasts (DAFs), besides providing public, marine and Tropical Cyclone (TC) warnings. Also, unlike in the past, weather forecasts and information are now included in the local newspapers and displayed on the public display information board.

A month of training in TC analysis and forecasting was carried out at the SIMS Headquarters in October 1997 by Steve West, formerly of Perth Regional Office, Australia, under the EU Project.

One of our officers has attended the recently held South-West Pacific Assistant Forecaster Course at the Australian Bureau of Meteorology.

The Low Resolution Satellite Receiving system is capable of capturing GMS-5, NOAA 12, 14 and 15 and Meteor 2–21 and 3–5. This Low Resolution Satellite Receiving system will become obsolete in the not too distant future as the Japanese Meteorological Agency will cease transmitting the WEFAX satellite pictures and replace it in the near future with digital transmissions. This will make the low resolution satellite reception in the Solomon Islands redundant. SIMS will then have no direct satellite photograph reception capability. Therefore, there needs to be a system (High Resolution Satellite Receiver) installed to replace the redundant one.

A DIgital FACSimile (DIFACS), a communication link between Melbourne, Australia and Honiara, Solomon Islands is still operational. This receives enhanced satellite imagery, national weather products (NWP) and other relevant data for continuous monitoring and forecasting of the weather. Telstra, Australia will eventually stop operating this system as it is not marketable or profitable as expected. Therefore, there needs to be a new communication system installed that is capable of receiving the required weather information and data.

An officer was attached to the Papua New Guinea National Weather Service to look at their communications system and its applicability to SIMS.

A public TC track map was produced by the Rotary Club, the National Airline and SIMS for public use during cyclone seasons. This has been distributed during disaster awareness programmes.

10.3 Climatological Section

SIMS has engaged in a few climate activities such as:

- Provision of climate information to the government, public and private sectors. It also provides advice to the government on climate issues at regional meetings such as the South Pacific Forum and the ongoing negotiation meetings of UNFCCC.

- Upgrading of CLICOM in Solomon Islands. The CLICOM system is functioning well and is fully operational after the installation of new computer hardware and software in October 1997 funded by the UK Government through the VCP of WMO.

  The funding was made possible following a VCP request by SIMS submitted to WMO in April 1996 to replace the old hardware and software system. The installation was done by SIMS staff. All daily data had been updated to 1998 while three of the seven synoptic stations are being updated to December 1997.

  Most of the voluntary rainfall stations' (about 40 stations) data had been entered into CLICOM while others with no complete geographical information (as required by CLICOM) are stored in Lotus,

Excel and INSTAT. The new system has a storing capacity of six Gigabytes. Currently about 200MB of synoptic, daily and upper-air data are already in CLICOM. The upper-air data have been imported in CLICOM using programmes written by Mr Mike Ariki, former Director of SIMS.

- Provision of information and advice on ENSO phenomena to the government, public and private sectors.

10.4 Training Section

There was no in-country Class IV Observer Training held in 1997 and this year. However, there were several funded overseas training courses that have been utilised by SIMS. These were:

- a five-month Electronics Technicians Training Course in Egypt from September 1997 to about February 1998 under the VCP of WMO;
- a two-year Diploma Course in Electronics Technology at the Royal Melbourne Institute of Technology (RMIT), Australia, starting February 1998 under bilateral funding from Australia;
- a seven-month South-West Pacific Assistant Forecaster Training Course, Australian Bureau of Meteorology, from March to September 1998 through funding from Australia and WMO;
- attachment by Steve West to conduct a one-month training course on TC analysis and forecasting to SIMS forecasters under the EU Project;
- recently, an officer was attached to the Papua New Guinea National Weather Service to look at their communications system and its applicability to SIMS under the EU Project; and
- there are five undergraduate students studying at the University of the South Pacific in the areas of Weather Forecasting, Meteorological Engineering and Climatology.

10.5 Technical Section

The two officers manning this section have attended relevant training courses such as:

- a five-month Electronics Technicians Training Course in Egypt from September 1997 to about February 1998; and
- a two-year Diploma Course in Electronics Technology at the Royal Melbourne Institute of Technology, Australia, starting February 1998.

10.6 Infrastructure upgrade

There has not been much input from the National Government to upgrade the current facilities of SIMS. Currently the Meteorological Headquarters is housed in a rented building.

SIMS has been working collaboratively with the Japan Weather Association (JWA) to put together a project proposal to the Government of Japan for equipment supply and facility construction for their next financial year. JWA has made two missions to Solomon Islands regarding this project proposal. The project proposal has already been submitted to the Embassy of Japan in Solomon Islands. It is our hope that this project will eventuate.

10.7 Government reform programme

It is likely that SIMS will be affected by the current Government Restructuring Programme. However, there is still time to persuade the public service to retain the potentially redundant staff.

To conclude, on behalf of the Government of Solomon Islands, I wish to thank WMO, Australian Bureau of Meteorology, AusAID, United Kingdom, European Union, NZODA and SPREP for providing support and assistance to SIMS.

11. Tuvalu

This report provides a summary of meteorological and climatological activities carried out by the Tuvalu Meteorological Service (TMS) since the Fourth SPREP Meeting of RMSD.

11.1 Meteorological activities

11.1.1 QFax

The QFax equipment was installed in March 1998. The equipment was provided under the European Union Tropical Cyclone Warning Upgrade Project (EU TCWUP). Training in the operation and maintenance of the equipment was carried out during the installation. There is a need for training on how to interpret the images and to use the images as a tool in weather forecasting. A GPS clock was included in the system. All wall clocks in the office are checked and corrected against the GPS clock.

The only problem encountered was with the operation and maintenance of the equipment as staff are still learning the system. This problem was resolved when further training was provided in October 1998. Otherwise the system has not had any technical faults and has been providing a reliable service.

11.1.2 Email

The email communication system was installed at the same time as the QFax system. The Meteorological Service of New Zealand Ltd provided and installed the system. The main purpose of the new communication system was to replace AFTN, which was dedicated to transmitting surface and upper-air data out of the country and to the users.

The system has not been reliable at times, mainly because the supply of international phone lines does not meet the demand. Modification of the system in October 1998 has improved the service provided, not only in communication speed but also in communication costs.

11.1.3 EMWIN

The EMWIN system was installed in late 1997, but was not operational until March 1998. The equipment was provided under the EU TCWUP. A new computer and an uninterruptible power supply (UPS) was provided for the system under the same project in October 1998. The latest EMWIN software version was installed in the new computer in October 1998. The UPS that was provided could only supply backup power for five minutes. There is a need for one that would supply power for much longer.

The system has been providing a reliable service except during the period when satellite GOES-9 was terminated and GOES-10 was coming into position.

11.1.4 Management Services Consultancy Project (MSCP)

This project is funded by New Zealand. The objective of the project is to phase out complete support by setting up effective and appropriate programmes to address the needs of the TMS.

11.1.5 Upper-air/radiosonde programme

Only one upper-air reporting station is still operational and uses the Digicora MW15 to measure upper-air temperatures and winds. Maintenance and upgrading of the equipment was carried out in the middle of 1998 by Meteorological Service of New Zealand Ltd. This programme is funded by World Weather Watch (WWW). Budgets in some areas of this were reduced to cover the high costs of GPS sondes.

11.1.6 Surface programme

One new AWS will be provided under the NZ MSCP. The US National Weather Service in Honolulu continues to support the only AWS that we have at present and has made a proposed visit to the station. All the manual stations have remained operational.

11.1.7 Weather bulletins and weather guides

We continue to receive the weather bulletins from Nadi and the synoptic discussions from Honolulu as useful guides to the weather outlook.

11.1.8 WMO membership

My government supports Tuvalu becoming a WMO member country and will lodge application formalities before the Congress meeting of May 1999.

11.2 Climatological activities

11.2.1 Clicom

The Clicom database was installed in October 1998. The equipment was provided under the NZ MSCP. Training on the operation and maintenance of the software was carried out during the installation.

11.2.2 Sea Level and Climate Monitoring Project

The phone line and power supply failures have been the two major problems to the tide gauge. Training attachments under this project have allowed three staff from the TMS to be attached to the National Tidal Facility in Adelaide from October 1997 to October 1998.

11.2.3 University of Hawaii tide gauge

The gauge is still operational.

11.2.4 Pacific Islands Climate Change Assistance Programme (PICCAP)

TMS staffs have been involved in workshops under this programme. Meteorological and climatological data have been frequently provided for the activities of this programme.

11.3 Closing/appreciation

On behalf of my government and the TMS, I would like to thank all the organisations that have provided assistance to the TMS, including the Meteorological Service of New Zealand Ltd, European Union, Australian Government, Australian Bureau of Meteorology, WMO, SPREP, US National Weather Service, Regional Specialised Meteorological Centre, Nadi and the sponsors and hosts of the Fifth SPREP Meeting of RSMD and Y2K Workshop.

A special thank you goes to all the consultants who have visited the TMS for the invaluable work and input during the visits.

And not forgetting the founders and key players of our Meteorological systems, in particular EMWIN; special congratulations go to them.

Lastly I want to thank all the National Meteorological Services participating in this meeting for their continued cooperation to the TMS.

12. United States of America

12.1 EMWIN

This was probably our most visible activity. During the year its transmission speed was increased from 1.2 to 9.6 kbs and we successfully transitioned to GOES-10 after the partial failure of GOES-9. We continue to add Pacific-related products. For example, it now carries, or will carry tropical cyclone warnings from Darwin, Brisbane, Tokyo, Noumea, Guam (NWS), Nadi, Papeete, Honolulu and Miami (Eastern Pacific). We also arranged for early delivery of equipment to permit installation to begin before the onset of cyclone season.

12.2 Tropical cyclones

Representatives of SPREP, the Samoa Meteorology Division, RSMC Nadi, and US NWS worked out revised procedures to avoid issuance of conflicting warnings by the two meteorological services and agreed to enhance data exchange between the two services.

In December 1997 the ESCAP–WMO Typhoon Committee (TC) decided to go to the use of names and numbers for the identification of tropical cyclones in bulletins issued by the RSMC Tokyo. An International Name List and appropriate procedures have been developed and will be presented for consideration at the TC meeting the first week of December in Manila. The US was involved in this process and the US and FSM have submitted names to the list. The use of the list is expected to become effective with the 2000 season. It will be used by all ESCAP and WMO member states and will replace the current JTWC name list.

12.3 Communications

Ongoing discussions involving the US NWS and Federal Aviation Administration, SPREP, the EC CWSUP and the telecommunication agencies of the two Samoas are directed at improving communications and data exchange between the two Samoas by replacing the current slow speed analogue communications channel with high speed digital channels. Implementation is likely by the middle of 1999.

12.4 Capacity building

The US, through the WMO VCP, is supplying WAFS receiving systems to Papua New Guinea, Vanuatu and Fiji. The installation of stations in Indonesia and the Philippines is either completed or under way. The Cook Islands have been encouraged to apply to the WMO VCP for a station.

In the training area the US, at the Meeting of RA V distributed to all member states, present CD-ROMs of training materials on marine and fire weather forecasting, hydrology for meteorologists, and a tropical cyclone case study. Copies of these training materials are available at this meeting for distribution to those SPREP members who were not present at Bali.

Also in the training area, the Micronesian Meteorologist Training Programme sponsored by the DOI, NWSPR, and the Government of Micronesia graduated the first student this summer. David Aranug of Yap received his BSc in Meteorology from the University of Hawaii and is now serving an internship at the NWS Guam Forecast Office. When this is completed he will return to Yap to head the Meteorological Service for Yap State, FSM. Two more students will graduate during 1999 and after their internship will head the meteorological services for the Republic of Palau and of Pohnpei State, FSM.

The US has also participated in WMO-sponsored training programmes, most recently the Public Weather Workshop held in conjunction with the meeting of the RA V Tropical Cyclone Committee, and will be participating in the upcoming workshop on the management of meteorological services scheduled for Fiji next month.

13. Vanuatu

13.1 Introduction

Vanuatu is currently undergoing a Comprehensive Reform Programme (CRP), involving both the public and private sectors.

13.2 Restructuring the public sector

In accordance with the Vanuatu CRP, the government is restructuring the public sector, and is currently implementing the rightsizing and reduction programme in the public sector, with the aim to:

- achieving an overall reduction of between 10 to 15 per cent in the total size of the public sector;
- ensuring that ministries and departments are structured so that they contribute to achieving government objectives or policies;
- working towards reorganising the public sector by replacing existing employees without appropriate capacity with people who have the appropriate capacity that is essential to the ministry and department strategies; and
- ensuring that people leaving the public sector are compensated and treated with care and respect.

13.3 How does the restructuring process affect the Meteorological Service?

The Ministry for Public Utilities and Infrastructure is one of the nine ministries of the Vanuatu Government, and the Meteorological Service is under this ministry. Other departments under this ministry include the Public Works Department, Civil Aviation Department, Ports and Marine Department and Postal Services. The Ministry for Public Utilities and Infrastructure is currently undertaking the restructuring of all departments under its portfolio with the aim of making them more efficient and effective in delivering services to the people of Vanuatu.

13.4 Restructuring the Vanuatu Government budgeting process

13.4.1 Programme budgeting

The Vanuatu Government also introduced the concept of 'programme budget', with the aim of directing funds towards the achievement of actual policy objectives (or outputs). Under programme budgeting, Vanuatu Government activities are divided into programmes. Allocations of budget can then be made to particular programmes according to the priorities of the government; instead of funding inputs (such as labour costs) to the administrative process as in the traditional budget process.

Programme budgeting links the government objectives or policies and programmes to the actual funds provided by the annual budget for the delivery of goods and services. The total (maximum) amount of funds that can be spent during the year by all ministries and their respective departments must be divided between them according to the priorities of the government and the policies it wishes to pursue.

Essentially, the Vanuatu Government budget is the translation of financial resources into human purposes. It may be characterised as a series of goals with price tags attached. Since funds are limited and have to be divided one way or another, the budget becomes a mechanism for making choices among alternative expenditures. The Vanuatu Government budget is the amount of money that Parliament has approved for the government to spend in delivering services to the communities.

13.4.2 Net funding

The budgets provided to the ministries and their respective departments are based on the budget 'bids'. However, the budget allocations do not necessarily equate to the budget bids. The past budget process has been that the ministries and their respective departments put budget bids in for higher amounts, which include new initiatives and optimistic spending estimates under existing programmes. It is the intention of the Vanuatu Government, starting in 1999, to separate new initiatives from ongoing services and to review them separately. Also starting in 1999, ministries and their respective departments will be given figures representing budget totals, for which they will have to budget.

The government may decide not to fund a particular existing programme or activity, may reduce funds provided to a programme or activity or may decide to reduce funding across all programmes and activities. Where programmes and activities are not funded, Directors or Managers should plan for these to cease, unless specifically agreed with the government for alternative arrangements to apply.

In the past, all revenues collected by ministries and their respective departments have been deposited into the general revenue fund, and dedicated revenue-collecting departments have not been rewarded for their efforts. Revenue has now been separated into two types:

- taxes and duties, which will continue to form the basis of the public revenue fund available to be appropriated to ministries and departments; and
- departmental fees and charges, which will supplement the public funds provided to departments to meet their total budget allocation.

Departments now control their own fees and charges. Departments which exceed their revenue target will benefit by retaining a share of the excess, while departments which fail to raise their target entitlement will not have access to their total expenditure appropriation as a result.

13.4.3 Development projects

Projects are defined as specific activities, which are donor funded.

Ministries are included in the budget but will now also include projects, which are partly funded or fully funded by aid agencies.

Projects are included in the budget so that the government and the people of Vanuatu can understand all the activities being undertaken by the ministries and their respective departments.

13.5 How does the restructuring of the budgeting process affect the Meteorological Service?

The introduction of the programme budgeting concept means that the Meteorological Service must reform itself in order to create an environment and facilities to implement the programme budgeting concept.

The Meteorological Service must develop its annual budget in accordance with the programme budgeting concept. It must clearly identify its programmes and activities and it must have clear objectives that are linked to the government policies.

13.6 The 1998 Meteorological Service programme and activities

- Directorship and administration
  - general administration
  - strategic planning and management
  - finance
  - computing

- Weather monitoring and operations
  - maintenance and equipment
  - communications
  - surface weather observations
  - upper-air weather observations

- Weather forecasting and tropical cyclone warnings
  - weather forecasting, information and services
  - Tropical Cyclone Operational Centre
  - European Union funded Cyclone Warning System Upgrade Project

- Climate programme
  - database
  - Pacific Islands Climate Change Assistance Programme (PICCAP)
  - sea level and climate change monitoring projects

Each programme and activity has its own training component.

13.7 Achievements for 1998 programmes and activities

13.7.1 Directorship and administration

- The documents for restructuring the Meteorological Service were prepared, completed and forwarded to the ministry responsible for meteorology.

- The strategic plan is currently under development.

- The 1999 budget document was prepared, completed and forwarded to the Ministry for Finance and Economic Management.

- The year 2000 problem action plan is currently under development.

- Vanuatu paid its outstanding 1997 and 1998 WMO contributions.

- The Director attended the Twelfth Session for the WMO RA V in Indonesia, funded by the Vanuatu Government.

- The Director attended the WMO RA V Tropical Cyclone Committee meeting in Indonesia, funded by WMO.

- The Director attended the Fifth SPREP/RMSD Meeting in Hawaii, funded by SPREP.

- The Director attended a Strategic Management Course in Vanuatu, funded by the Vanuatu Government.

- The Director and the Office Supervisor attended the Programme Budgeting Training Course in Vanuatu, funded by the Vanuatu Government.

- One officer completed a Diploma in Computing in Australia, funded by AusAID.

- The Deputy Director participated in the China Study tour, funded by the Government of the People's Republic of China.

13.7.2 Weather monitoring and operations

- Upgraded two computers for SITA communication. The computers are year 2000 compliant, funded by the Vanuatu Government.

- Installed new HF radio at Sola Weather Observing Station, funded by the Vanuatu Government.

- Installed new HF radio at the Meteorological Service Headquarters, funded by the Vanuatu Government.
- Inspection of Pekoa, Tanna, and Lamap weather observing stations.
- Refurbished officers' houses and offices at Sola Weather Observing Station, funded by the Vanuatu Government.
- Refurbished officers' houses at Pekoa Weather Observing Station, funded by the Vanuatu Government.
- Moved Tanna Weather Observing Station to a new site, funded by the Vanuatu Government.
- Upgraded the upper-air observing system, funded by the Vanuatu Government.
- Full maintenance on the hydrogen generator, funded by the Meteorological Service of New Zealand Ltd.
- Installed the new satellite receiving equipment (QFax), funded by Australia's Bureau of Meteorology through the WMO/VCP.
- Assisted the EU CWSUP to install the EMWIN system.
- One technician did attachment at Meteorological Service of New Zealand Ltd, funded by the EU CWSUP.
- A weather observer and the Inspector and Facility Officer attended the WMO Class IV Basic Weather Observer Course in Fiji, co-funded by WMO and the Fiji Meteorological Service.
- Two weather observers attended the WMO Class IV Basic Weather Observers Course in New Zealand, funded by NZODA.
- The Inspector and facilities officers attended the Basic Equipment Maintenance Workshop in Australia, funded by WMO.

13.7.3 Weather forecasting and tropical cyclone warnings

- The 1998–1999 Tropical Operational Directive was completed in September of 1998.
- Strategies were developed to issue tropical cyclone warnings in English, French and Bislama.
- EMWIN system was installed under the EU CWSUP.
- Internet system was installed under the EU CWSUP.
- Two weather forecasters and the Director did attachment at RSMC Nadi under the EU CWSUP.
- The Deputy Director attended the International Conference on Tropical Cyclones under the EU CWSUP.
- Three officers graduated with WMO Class II in the Assistant Weather Forecasting Course in Australia, funded by AusAID.
- Two officers participated in the maintenance workshop for the EMWIN system in 1998, funded by the EU CWSUP.

13.7.4 Climate programme

- WMO purchased new CLICOM hardware for Vanuatu, and these computers are year 2000 compliant.
- Country coordinator for PICCAP was appointed.
- The Meteorological Service Computer and Information Officer is assigned on a part-time basis, to assist the PICCAP National Project Coordinator.
- Real-time display computer system for the Sea Level and Climate Monitoring Project was installed, funded through the Sea Level and Climate Monitoring Project.
- The Deputy Director of the Meteorological Service, one officer from the Department of Geology and Mines, and one officer from the Survey Department participated in the Sea Level and Climate Monitoring Project in Australia.
- One climatologist attended the CLICOM training in Australia, funded by AusAID.
- The Computer and Information Officer attended the CLICOM workshop in Malaysia.
- The National Advisory Committee on Climate Change (NACCC) was formed, and the Meteorological Service is a member of NACCC.

13.8 The way forward

I would like to conclude by informing the meeting that it is Vanuatu's wish to see all PICs' National Meteorological and Hydrological Services (NMHSs) continue to develop with the aim of providing better and timely weather services to the communities. In order to develop, it is essential that all PIC NMHSs develop strategic plans and have these plans available to the bigger NMHSs in the region and to donor agencies.

Annex 5: Executive summary and recommendations of the Y2K Workshop

Having met in Honolulu, Hawaii, from 8 November 1998 through 10 November 1998, participants of the Workshop on the Year 2000 Problem have agreed to the following summary and recommendations which are directed toward government decision-makers and relevant organisations.

There are slightly over 400 days left before the date change to the year 2000 (Y2K). Therefore, there has been a realisation within the WMO, SPREP and many others that, given the widespread use of computers that support meteorological operations, it is imperative for any computer systems affected by the Y2K problem (e.g. hardware, software, communications, infrastructure) be Y2K compliant. The problem is not relegated to the meteorological equipment for any one nation. Given the interconnectivity of today's networks and systems, it is vital that any National Meteorological and Hydrological Service (NMHS) coordinate with vendors of expendable items and services, the infrastructure of the state (e.g. telecommunications, power and water) as well as with neighbouring countries to share information on Y2K to ensure compliance, in a timely manner, from all these sectors.

In summary, the Y2K problem stems from an old practice in computer systems architecture that was employed to save memory space in the days when computer memory was a very scarce and expensive resource. In order to save memory, only the last two digits of a year were used to depict and process that information (e.g. 1998 was processed as 98). The problem with the year 2000 is that, if not fixed, the two-digit value of '00' could be interpreted as the year 1900 rather than the year 2000. This presents a number of problems that range from computers shutting down, to data being inadvertently purged due to automated archiving. While the extent of the Y2K problem may never be fully known, good management practice dictates that measures be taken to ensure that the impact to operations is minimised by having a Y2K programme in place that stresses an inventory of computer-based systems, renovation, testing, and constant diligence to ensure that the problems are known and are solved effectively. As in any good management practice, contingency plans must also be in place to take care of any problems that are somehow overlooked or undetected.

The recognition of the Y2K problem and its possible effects on meteorological operations, along with recommendations to help mitigate the problem, were the centrepiece of this workshop. A number of presentations were made that focused on the Y2K problem itself. Various organisations such as the US National Weather Service, WMO, Meteorological Service of New Zealand Ltd, Federal Aviation Administration, and Hawaii State Civil Defense presented what they were doing about the problem. Following that, three working groups were established: (1) Observing Systems; (2) Telecommunications; and (3) Data Processing, in order to come up with practical recommendations that could be used by the members of SPREP to help mitigate the Y2K problem in each member's NMHS.

The following recommendations and actions were generated and adopted by the workshop participants:

1. Explore opportunities with the WMO, SPREP, and EU CWSUP for securing funds to assist NMHSs in mitigation efforts for the Y2K problem.

2. Form a task team consisting of members from or arranged by the WMO, US National Weather Service, Meteorological Service of New Zealand Ltd. and the SPREP Secretariat to provide special assistance to SPREP members in mitigating the Y2K problem.

3. Encourage members to exchange information with other parts of their government and with other NMHSs in SPREP and with WMO to raise awareness and maintain diligence in tackling and solving the Y2K problem.

4. Members are encouraged to perform a detailed inventory of their hardware, software, and communications interfaces and provide it to the SPREP Secretariat as well as the new WMO subregional office based in Samoa. This inventory will not only focus the members on the required actions for Y2K, but will also provide an inventory of telecommunications capabilities that will assist the SPREP Y2K task team noted

in (2). This would also be useful in deciding where scarce resources should be applied in order to ensure at least minimal Y2K compliance after 31 December 1999.

5. While it is not a low-cost solution, a recommendation was made that one Y2K contingency to be considered in the Pacific would be to upgrade some key World Aviation Fixed Stations (WAFS) sites from one-way receive to two-way receive/transmit stations to allow for the uninterrupted transmission of raw meteorological data. In order to start this process, a formal recommendation from SPREP should be forwarded to WMO stating that the upgrade of the WAFS Pacific Ocean Region satellite facility in Yacoult, Washington to two-way capability would be a good Y2K contingency. From that, the WMO would have to make a formal request to the US for such an upgrade. Details (e.g. costs, procedures etc.) will need to be worked out to determine if such an upgrade is feasible.

6. The Survey of Y2K Status (see Report on the Y2K Problem Workshop, Honolulu, Hawaii, 1998, SPREP, WMO and US NOAA NWS) accomplished just prior to (and during) the Honolulu Y2K Workshop needs to be kept up to date as work progresses toward full Y2K compliance in the SPREP member countries. SPREP member countries are urged to keep their status under review and provide frequent updates of the information and data to the SPREP Secretariat. WMO members are reminded that the WMO Secretariat needs to be kept informed as to their Y2K status.

7. SPREP member countries should check and evaluate not only their meteorological systems, but consult with their providers of power, water, telecommunications (PTT), providers of consumables, expendables and spare parts, fuel and customers to ensure they are Y2K compliant. This will help ensure uninterrupted service within the NMHSs and to those they serve.

8. SPREP member countries are urged to consult the WMO Web site (WWW section and the Y2K pages) to see what is the latest information and guidance.

9. Because there could be a disruption of supplies in early 2000, it may be prudent to ensure a full allowance of consumables, expendables and spare parts are on hand by mid-December 1999.

10. Tests of systems, consultation with manufacturers etc. should be completed as high priority actions. For example, in Annex 1, the Telecommunications (Section 2) Group identified a number of systems and has listed a number of recommendations and actions that SPREP members should accomplish. SPREP members are urged to complete these items by early 1999—at the latest, by 31 March 1999.

11. As a result of discussions during the Y2K Workshop in Honolulu, it became apparent that it would be useful (in deciding where scarce resources should be applied in order to ensure at least minimal critical Y2K compliant telecommunications services after 31 December 1999 as well as working out alternate or contingency routing of data and products) to have a condensed inventory of available telecommunications systems in each SPREP member country. It is recommended that the SPREP Secretariat compile as a priority action the information necessary to complete the table shown in Annex 5 of the Y2K Workshop Report (available from the SPREP Secretariat)—including systems which are not listed.