



**Second  
SPREP Meeting  
of Regional  
Service Directors**



Held on  
**3 -5 October 1994**  
in **Nadi, Fiji**

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## Meeting Recommendations

Having met in Nadi, Fiji, from 3-5 October 1994, the participants at the 2nd SPREP Meeting of Meteorological Service Directors have agreed on the following specific recommendations which are directed toward government decision makers and related organizations:

### Regional Government Motivation

1. The meeting noted with concern the lack of support of high level decision makers to a number of the meteorological services in the region, the failure of government decision makers to effectively use climate information in planning, and the paucity of national climate policies relating to climate. It is recommended that Pacific island governments urgently:

- Recognise the vital role of national meteorological services with regard to climate change and climate, and the need to establish a sound climate programme as a foundation for addressing regional climate variability and climate change concerns and sustainable development;
- Affirm their commitment to regional cooperation between meteorological services through the provision of funding and resources to facilitate such cooperative links;
- Seek technical assistance from their national meteorological service and organizations such as WMO and SPREP to develop and implement national climate policy.
- Liaise with their national meteorological service to look at ways of promoting staff retention, thus reducing the loss of valuable resources which occurs in such cases.

### Regional Coordination

2. The participants welcomed the continued expansion in the involvement of the French territories in regional meteorological activities. To facilitate further integration, the meeting asked SPREP to assist in finding ways of overcoming obstacles, such as language difficulties, to the optimum participation of France in regional meteorological cooperation.

3. The meeting noted SPREP's role, in collaboration with WMO, in coordinating and facilitating regional cooperation of climate activities and complemented their progress to date. To further enhance the effectiveness of SPREP in the area of regional coordination, the meeting recommends that SPREP management consider the following suggestions:

- SPREP work toward maximising the benefits arising from its close working arrangement with WMO;
- Establish direct links between the SPREP Climate Change programme and the heads of national meteorological agencies to facilitate coordination;

4. In recognising the need for a formal body to develop areas of regional cooperation, the meeting recommends that a small working committee be established under the auspices of SPREP, and in liaison with WMO RA-V Working Group on Climate, comprising two or three heads of Pacific island meteorological services, and representatives of interested metropolitan countries, to develop detailed strategies for long term coordination between the meteorological services of SPREP member countries. This group should develop a strategy for future regional cooperation and consider other areas in the activities as required. SPREP will convene this group, with a view to a meeting being held in the first quarter of 1995.

5. To continue the momentum established in these first two meetings, it is recommended that SPREP endeavour to secure funding for a 3rd annual meeting in 1995. In the interim period, SPREP is requested to study options for continuing this close collaboration with less reliance on donor funding, and report their findings to the next meeting. Further, SPREP will provide a review of activities and results from the first two years of activity.

6. The meeting notes the establishment of the WMO Working Group on Climate for Regional Association Five (RA-V) at the Eleventh session of RA-V in Noumea, New Caledonia, May 1994, and welcomes the conclusion of a formal working relationship between SPREP and WMO following the 46th WMO Executive Council Meeting in June 1994. It is recommended that the SPREP and WMO secretariats liaise closely to maximise the

efforts of each. In particular, such coordination should focus on:

- Exchanging of information arising from activities associated with the Sea-Level and Climate Monitoring Project;
- Regional support for CLICOM.
- Training issues.

7. The meeting acknowledged the effort made by WMO to assist in applications for membership of those countries in the region who are not members of WMO. Participants urge that every available assistance and resources be made available to Pacific island countries who wish to join WMO.

8. The meeting acknowledged the important and enduring support of their regional and international partners. Pacific island countries noted priority issues to be considered by donors when considering meteorological projects. They are:

- Strengthening of capacity, particularly staff training and development and the procurement of technical equipment;
- Up-grading of meteorological facilities, including buildings and libraries.

9. The meeting calls upon regional donors to continue their close and regular collaboration to ensure that possible duplication of effort is avoided, and, where-ever possible, equipment and procedures are standardised.

### **Nadi Tropical Cyclone Warning Centre**

10. In noting the significant progress made by Fiji Meteorological Service in their quest for designation as a Regional Specialised Meteorological Centre under the WMO World Weather Watch, delegates call upon regional governments to affirm their support for the up-grading of facilities of Nadi Tropical Cyclone Warning Centre. The meeting noted that project proposals for further up-grading of facilities of Nadi Tropical Cyclone Warning Centre are with donors, and recommends that donors consider these favourably.

11. The meeting recommends that those countries presently served by Fiji Meteorological Service through the provision of meteorological information establish formal arrangements with Fiji to secure continuous and reliable meteorological forecasts for the future.

## **CLICOM**

12. The meeting noted the interim report on the Review of CLICOM in the Pacific Region. It is recommended that SPREP formulate a regional strategy for the establishment and development of CLICOM based on the final recommendations of this report. This strategy will be considered by the Coordinating Committee, and form the basis for a secure climate data storage and processing facility to provide useful climate information to users in this region.

### **Training**

13. To maximise the benefits of training of meteorological staff the meeting recommended that:

- Future national training programmes be developed based on pre-determined objectives for the meteorological services concerned;
- More use be made of existing training programmes within countries such as computer training courses;
- Where-ever possible and practical, training be provided in-country, including establishment of local technical training programmes utilising senior and experienced local staff;
- Greater effort be made to ensure that all countries within the Pacific have access to the total pool of training both within the region, and internationally.

### **Communication**

14. The meeting noted the recommendation of the first meeting regarding communication, and the continuing importance placed upon improving communications in the Pacific islands. Participants agreed that urgent and significant work is required to improve meteorological and climatological communications, both within the region and to the rest of the world.

# Meeting Report

## Introduction

1. The Second SPREP Meeting of Meteorological Service Directors was convened in Nadi, Fiji from 3-5 October 1994, and follows the inaugural meeting held in Port Vila, Vanuatu, from 19-21 October 1993. The meeting was funded by the Government of France, with assistance from the Government of Australia, the World Meteorological Organization and the Vaisala (Australia) company. The Fiji Meteorological Service is to be greatly acknowledged for hosting this meeting and providing logistic and administrative support.

2. The objectives of the meeting were to:

- Further progress made toward regional cooperation in climate monitoring and climate data services;
- Review on-going activities in support of regional climate programmes;
- Consider strategies for securing long term regional cooperation in climate services;
- Assist SPREP in developing its Climate Change programme, especially in the meteorological and climatological sectors, and;
- Discuss the working relationship between SPREP and the World Meteorological Organisation (WMO);

## Opening Session

3. The Permanent Secretary for Civil Aviation and Tourism in Fiji, Mr. Poseci Bune, delivered the welcome on behalf of the Government of Fiji. Mr. Bune spoke of the strategic importance of meteorological services in dealing with the impacts of climate and destructive meteorological phenomena.

4. Mr. Donald Stewart, Deputy Director of the South Pacific Regional Environment Programme (SPREP) welcomed the delegates on behalf of the Director of SPREP. He called upon delegates to use this forum to find ways of securing long term cooperation in the Pacific regarding climate services.

5. The Director of the World Meteorological Organization (WMO) Regional Office for Asia and South West Pacific, Mr. Eisa Al-Majed spoke on behalf of the Secretary General of WMO. Mr. Al Majed outlined the current activities of WMO, and reaffirmed its commitment to the meteorology and climate services in the region, particularly through the programmes and activities of RA-V. (see Annexes 3-5 for the complete text of all speeches)

5. Following the opening speeches, delegates were asked to consider the provisional agenda. With no amendments made to the agenda, it was approved as tabled, and is included as annex 1 of this report.

## Item 1 - Review of Current Climate Programmes and Activities

6. The meeting began with a statement from the Secretariat to summarise the objectives of the meeting. The importance of such meetings was highlighted, and all participants were asked to be aware of the need to develop useful and detailed recommendations at the conclusion of this meeting. Meetings such as this one are the most effective way of developing strategies for regional cooperation, however they are expensive to convene. Participants were asked to consider whether there were less expensive ways of maintaining the same level of coordination, and what obstacles would be faced. It was noted that in many countries there is little political support for climate or climate policy, which is an significant impediment to implementing a regional climate cooperation plan.

7. To conclude the summary of the meeting objectives, the secretariat outlined their role in coordination of climate activities. It was noted that climate change concerns need to be viewed in the context of the science of meteorology. Any understanding of *climate change* in the Pacific region is conditional upon sound knowledge of *climate* in the Pacific region. SPREP takes the view that meteorological services, as the centres of meteorological information and expertise, play a fundamental role in understanding climate, and hence climate change, and therefore deserve the full support of all the people of the Pacific islands.

8. Mr. Eisa Al-Majed (WMO) spoke on the climate activities of the World Meteorological Organization. The speaker summarized ongoing activities including the World Climate Programme (WCP), Global Climate Observing System (GCOS), and the World Climate Research Programme (WCRP). The important role of WMO in the Intergovernmental Panel on Climate Change (IPCC) was also highlighted. Reference was made to the need to link climate services to sustainable development, and particular reference was made to the establishment of the Working Group on Climate for Regional Association Five (RA-V) and the benefits it will have for the Pacific region.

9. Delegates acknowledged WMO's important role in coordinating international meteorological activities, and thanked WMO for their support, in particular the special assistance given to non-member countries of the region to attend the Eleventh Session of RA-V at Noumea, New Caledonia in May 1994. Western Samoa asked the speaker to comment on coordination of international activities. In responding, WMO noted the need to begin at a local or national level, and work up to regional, and international levels. Solomon Islands asked about requirements of countries under the Framework Convention on Climate Change (FCCC). The SPREP Secretariat summarised the legal responsibilities of the signatories to this convention, and provided information on SPREP activities to support Pacific Island Countries (PICs) in meeting these requirements.

10. The draft SPREP Climate Change Work Programme 1994-1997 was introduced by the Secretariat. This document was presented at the Seventh SPREP Meeting (Governing Council of SPREP) following this meeting for endorsement. Neville Koop outlined the process of preparing this document, in particular the role of the SPREP Climate Change Task Team in providing expert critical comment on the content and usefulness planned activities. Delegates were asked to note the content of the work programme, and its method of preparation.

11. The delegates from each country and territory were asked to comment on progress and activities in their country since the meeting in Port Vila. Summaries of statements provided can be found in Annex 6.

## Item 2 - Activities in Support of Regional Climate Programmes

12. The session began with an overview of the SPREP Training Needs Analysis. An interim report prepared by SPREP was presented to delegates for their consideration. In reviewing the information contained in the report, it was noted that training was one aspect of meteorology that could potentially benefit significantly from regional cooperation.

13. The large variability in the capacities of meteorological services in the Pacific islands is a significant factor in determining training needs. Some meteorological services, particularly those associated with the United States and France through their territorial and administrative history, are quite sophisticated. Others, particularly those of the independent countries of the South Pacific, are very small will only very basic capabilities. In a number of countries there needs to be a concerted effort to develop a long term strategy for the provision of meteorological services before training requirements can be identified.

14. The issue of training is an important one, and there was much discussion on this topic. The United States referred to the issue of training in climate services, and stated that he will include this on the agenda for the forthcoming Meeting of Micronesian Heads of Meteorological Services in Guam, scheduled for November 1994. The United States delegate offered to make training available to make better use of existing climate data presently kept at US affiliated meteorological offices.



15. Vanuatu noted that computers were being used by staff who were not adequately trained. In particular, he referred to the need for training and understanding computer operating systems, computer languages, computer programming and computer maintenance. Fiji noted that inadequate training can compromise the quality of service provided, and supported the call for more computer training. As a provider of training to many Pacific island countries, Fiji suggested that the concept of a regional training centre be discussed by participants. This would require the support and cooperation of WMO.

16. The Chair (Western Samoa) praised New Zealand for their past and present training assistance to Pacific island countries, and stated his support for the regional training centre concept. In responding to the issue of a regional training centre, WMO (Mr. Al Majed) noted that such a facility existed within RA-V, in the Philippines. Training is free at this centre, however countries need to arrange for travel and accommodation costs. This facility is, of course, mainly tasked with supporting WMO members. However a training register covering all the courses is available to anyone who is interested.

17. The delegate from New Zealand commented that more emphasis should be placed on self help to alleviate the need for assistance from outside the Pacific islands. It was noted that there are abundant institutions, such as universities and technical colleges within the region, and these should be used to provide more of the generalised training such as computer skills. New Zealand also referred to the statement earlier by Fiji concerning quality of services being affected by training. The delegate wished to affirm that present standards of meteorological data monitoring in the Pacific islands was generally quite good.

18. The issue of meteorological training is closely linked with the development of meteorological programmes within the Pacific islands. Following discussion at the first SPREP Meeting of Regional Meteorological Service Directors it is clear that there is a need to coordinate training among the meteorological services of the region to ensure that opportunities are maximised, skills and standards are maintained at a consistent level, and an adequate cadre of appropriately trained staff are maintained to perform the many varied duties required to operate a meteorological service.

19. Following the discussion on training, Mr. Bruce Ereckson (NIWA) presented an interim report on the review of CLICOM in the Pacific region. This interim report was based on a study tour undertaken on behalf of SPREP to prepare a review and inventory of CLICOM equipment. The report considered progress and activities in the 10 Pacific island countries who use CLICOM (Cook Islands, Fiji, Kiribati, Niue, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa). It was found that the progress made with CLICOM was generally poor, though there is a wide spread in the individual capacities.

20. With the exception of possibly one or two countries, no-one was using the CLICOM equipment anywhere near its optimum level. Problems encountered included hardware which was either inadequate or poorly sourced, software which was either out of date or corrupted by viruses, inadequate or insufficient training, and the absence of support. There has been some progress in WMO member countries, where support is better than elsewhere, but by and large CLICOM has not met the expectations of users, which has resulted in poor progress toward the aims and needs of Pacific island meteorological services.

21. The President of WMO RA-V thanked SPREP and the consultant for the comprehensive summary of the use of CLICOM in the Pacific islands. The need to connect SPREP and WMO working arrangements closely to support CLICOM in the region was noted, and the delegate from WMO briefed the meeting on the RA-V CLICOM Support Centre in Malaysia.

22. The delegate from Fiji thanked SPREP also, and commented that this report should open a lot of eyes of those in the region who use and support CLICOM. The delegate noted that in Fiji there is a need to upgrade software and user packages, and that there is a need to shift from the present focus on data entry toward an output-based programme. New Zealand noted that, in light of the recommendations from this report that a regional support programme for CLICOM was needed. It was suggested that SPREP convene a user-group meeting of 2 or 3 Pacific island countries to discuss how this may be achieved. The Secretariat agreed to look into this, with a view to convening such a meeting after the final report is completed.

23. The next topic discussed concerned the working arrangements between SPREP and WMO. The meeting was briefed by Neville Koop on the current arrangements and their implications to both organizations. At the 46th meeting of the WMO Executive Council (EC) in June 1994 the Secretary General approved the draft working arrangements, which were subsequently signed by the Director of SPREP. These working arrangements set in place a framework for collaboration and cooperation toward improving the capacity of Pacific island meteorological services. WMO praised the establishment of such a working arrangement with SPREP, and noted that WMO has similar agreements with other regional organizations such as the Economic and Social Council for the Asia and Pacific (ESCAP) and the Association of South East Asian Nations (ASEAN).

24. To further collaboration between SPREP and WMO, the President of WMO RA-V noted the formulation of a new Working Group on Climate at the Eleventh Session of RA-V in Noumea in May 1994, and suggested that SPREP work closely with this new working group toward improving climate programmes in the Pacific region.

25. Dawn Thistlethwaite (Bureau of Meteorology) spoke on the Pacific Meteorological Services Project (PMSP). The Australian Government, through the Australian Agency for International Development (AusAID), has committed A\$1.1 Million toward improving basic climate monitoring programmes and networks in the South Pacific. This three year project commenced in December 1993, and is being implemented by the Bureau of Meteorology, and has two (2) general components:

- Component 1: Meteorological Observations Facilities Improvement is already well under way, with the project technical specialist having visited Fiji, Niue, Tonga, Solomon Islands, Vanuatu and Western Samoa. Equipment needed for these countries have been assessed, and orders for their procurement have been placed. The remaining countries (Cook Islands, Kiribati, Papua New Guinea and Tuvalu) will be visited in 1995.
- Component 2: Training and Inspection, commenced in the latter half of 1994 with the appointment of a training specialist, who will visit the countries already visited by the technical specialist to follow up installation and maintenance and train personnel in skills to use and maintain the equipment provided.

26. The Bureau of Meteorology emphasised that PMSP project is intended to support basic climate monitoring networks, and will not become involved in communications, computer networks, or sophisticated technologies such as radar and satellite equipment. The speaker praised the continued support provided by other organizations such as New Zealand Meteorological Service, and noted their desire to coordinate closely with such on-going programmes. To conclude it was noted that the benefits of PMSP go beyond the Pacific, as it will enhance international climate monitoring programmes such as the WMO Global Climate Observing System (GCOS).

27. The meeting thanked Australia and the Australian Bureau of Meteorology for their continued support, commended the Project Manager for work already completed, and welcomed future activities in this project. Several delegates from countries involved asked for comments on the expected length of this support. The Bureau of Meteorology reaffirmed that this was a three year project, but noted that support would hopefully be provided beyond this period if resources were available. New Caledonia noted that there is a significant store of unused basic climate monitoring equipment in the Pacific belonging to Metro France, and offered it for use by other meteorological services if needed.

28. To conclude discussion on Item 2, David Roberts (New Zealand) spoke on the Pacific Islands Programme (PIP) of New Zealand Meteorological Service. In opening his presentation, the delegate from New Zealand emphasised that support for Pacific island meteorological services is provided under a contract between the Government of New Zealand and New Zealand Meteorological Service, and funding, through New Zealand foreign aid, was secured and in fact had been recently expanded in some areas. As a commercial contract, there is a need to ensure that service provided is effective, efficient and economical.

29. The need to ensure close cooperation between PMSP and PIP was reaffirmed, particularly relating to training and the calibration of equipment, to ensure standards were consistent. The Cook Island is a special case, being funded almost entirely through New Zealand foreign aid, and some problems with funding certain components of this programme. The speaker noted that this would be discussed further in the WMO Tropical Cyclone Committee Meeting immediately following this meeting.

30. Communications was recognised as one of the main obstacles to developing meteorological services in the Pacific. New activities such as the World Area Forecast System (WAFS) and International Maritime Satellite (INMARSAT) offer considerable hope and potential to solving these problems.

### Item 3 - Issues Relating to Regional Climate Activities

31. The session on Regional Climate activities which support regional climate programmes began with a presentation by Jacques Merle (ORSTOM) on activities within ORSTOM relating to the El Niño-Southern Oscillation (ENSO) phenomenon and climate prediction. The presentation focused on the current state of scientific knowledge on ENSO, and how this knowledge can be used for predicting climate on a seasonal to inter-annual basis. In particular, it was noted that shortly there will be a move from experimental forecasts to operational forecasts.

32. In the discussion which followed, The United States noted that in November 1994 a meeting will be convened to consider a USA proposal for a multi-national climate prediction programme. The participants welcomed the prospect of predicting future phases of the ENSO signal, and the benefits such knowledge will bring, particularly relating to the risk of climate extremes such as drought, floods and tropical cyclones.

33. Jean Pierre Mac Veigh (New Caledonia) gave a presentation of the activities of Meteo France in the Pacific region. Meteo France maintains offices in New Caledonia, Wallis and Futuna, and French Polynesia. Meteorological services operate in each of these territories, with the Wallis and Futuna office administered by New Caledonia. There are over 3000 staff employed by Meteo France throughout metropolitan France and its territories around the world. In 1993 the Government of France commercialised the public weather forecasting component of Meteo France, however the organization remains a specialised government agency.

34. While there is no specific policy regarding the participation of Meteo France in regional meteorological programmes, the delegate from New Caledonia emphasised that he and his colleagues welcomed the opportunity to participate and provide input to regional meetings and activities. This is consistent with the wishes of the French Government to participate in regional activities, demonstrated by their sponsorship of this particular meeting.

35. To conclude the presentations, SPREP provided a brief summary of the South Pacific Sea-Level and Climate Monitoring Project. This project, funded by Australia for South Pacific Forum Countries, has been underway for over 3 years. Data acquisition from gauges already installed is progressing well. The National Tidal Facility (NTF) in Flinders University in Adelaide collects data from all instruments and issues monthly bulletins to all countries involved. The gauge in Papua New Guinea is to be installed on Manus Island shortly. Upon the installation of the last station in Papua New Guinea, all 11 sea-level monitoring gauges throughout the Pacific islands are in full operation.

36. Training workshops to support this project will continue in the future. To conclude the first phase of the project a major scientific meeting will be convened in Adelaide, Australia, in October 1995. In the meantime further of workshops will be held in October 1994 and continue in March 1995.

37. Participants thanked Australia and SPREP for their continued involvement in this project, and were appreciative of the improved understanding of the science of climate change and sea level rise this project had brought. The delegate from the Federated States of Micronesia (FSM) welcomed the opportunity for his country to participate in the training component of this project, but asked why FSM, which is a member of the South Pacific Forum, does not have a gauge installed. The delegate from Niue, also a South Pacific Forum country, similarly asked why Niue has no gauge. In response, SPREP acknowledged that not all Forum countries had received gauges yet, but noted that there were plans for gauges to be installed in FSM and Niue at some point in the future.

38. The meeting broke from round table discussion and reconvened into three smaller groups for regional discussions. Participants were grouped into Micronesia, Melanesia and Polynesia. Delegates from other organizations and invited experts were mixed around the various groups to add to the discussions. The participants were invited to talk upon issues of regional relevance, and provide a framework for the recommendations that might arise from this meeting.

#### **Item 4 - Development of a Strategy for Climatological Cooperation in the Pacific Region**

39. The meeting reconvened for a round table discussion to consider steps needed to further progress on regional cooperation, and prepare recommendations which the meeting wished to see adopted. A lively and open debate ensued, with many topics raised for consideration. The Cook Islands noted that there is a need to take the message of regional cooperation to governments for their endorsement and support. The issue of the establishment of a committee or organization to oversee regional cooperation was discussed. Delegates recalled the very useful advice and information provided by Mr. Berridge of the Caribbean Meteorological Organization at the first Directors of Meteorological Services Meeting in Port Vila, and stated their wish to see similar success with regional co-operation in the Pacific islands.

40. It was noted that earlier in discussions the concept of a CLICOM Users Working Group was raised. Several delegates suggested that perhaps the size and mandate of this group be expanded to look at all aspects of regional cooperation and develop a strategy for regional cooperation. This idea received support from all participants, and was suggested as a firm recommendation of the meeting.

41. Many country participants commented that greater support from government would improve the level of service provided by the meteorological services of the region. While understanding that there are demands on governments from many differing sectors, the meeting called upon Pacific island governments to recognise the important role played by meteorological services in supporting social, economic and environmental development of island countries.

42. To foster greater support, participants noted the need for greater contact between directors of meteorological services and their ministerial and public service colleagues, and the media, to inform government and the public of the importance of meteorological services in national development.

43. A number of further recommendations were made by the meeting which highlighted new concerns for the region or reflected on previous recommendations from the First SPREP Meeting of Regional Meteorological Service Director's held in Port Vila in 1993. In particular, the meeting highlighted the importance of meetings such as this, and endorsed the continuation of similar meetings of meteorological service directors in the future. The complete list of recommendations are shown in Annex 7. There being no other business, the meeting was formally closed at 12.40 PM on Wednesday 5 October.

## Annexes

### Annex 1: Agenda

#### MONDAY 3 OCTOBER 1994

- 0830-0915 Registration
- 0915-0930 Welcoming remarks from Government of Fiji
- 0930-0945 Opening remarks by SPREP
- 0945-1000 Introduction from WMO
- 1000-1030 Morning Tea
- 1030-1045 Procedural arrangements (*chair, session times, approval of agenda, etc.*)
- Item 1: Review of Current Climate Programmes and Activities**  
*Chairperson: Arona Ngari (Cook Islands)*
- 1045-1100 Summary of project and statement of aims of meeting (*SPREP*)
- 1100-1130 Climate Activities of the World Meteorological Organization (*WMO*)
- 1130-1200 Review of SPREP Climate Change Work Programme 1994-1997 (*SPREP*)
- 1200-1330 Lunch
- 1330-1500 Country statements (*10 minutes per country*)
- 1500-1530 Afternoon Tea
- 1530-1700 Country statements continued (*10 minutes per country*)

#### TUESDAY 4 OCTOBER 1994

- Item 2: Activities in Support of Regional Climate Programmes**  
*Chairperson: Ausetalia Tilimaea (Western Samoa)*
- 0830-0930 Training Needs Analysis; SPREP Report.  
*(Discussion, and recommendations for future training programmes)*
- 0930-1030 CLICOM Review and Inventory; SPREP Report.  
*(Discussion, and recommendations for regional CLICOM programme)*
- 1030-1100 Morning Tea
- 1100-1130 Working Arrangement between SPREP and WMO  
*(Summary of present Working Arrangement recently agreed to by SPREP and WMO. Discussion on future areas of cooperation)*
- 1130-1200 Pacific Meteorological Services Project  
*(Project funded by AJDAB and implemented by Australian Bureau of Meteorology, update on activities) (Dawn Thistlethwaite, Executive Officer, Bureau of Meteorology)*
- 1200-1230 The New Zealand Meteorological Service Pacific Islands Programme  
*(David Roberts, Pacific Manager)*
- 1230-1400 Lunch

**Item 3: Issues Relating to Regional Climate Activities.**

*Chairperson: Mapusaga Fuamatagi (Tuvalu)*

1400-1430 Activities of ORSTOM in relation to ENSO and Climate Prediction

*(Jacques Merle, Representative for the Pacific, ORSTOM, Noumea)*

1430-1500 Activities of Meteo France in the Pacific Region

*(Jean Pierre Mac Veigh, Director Meteo France, New Caledonia and Wallis and Futuna)*

1500-1530 South Pacific Sea-Level and Climate Monitoring Project (SPREP)

1530-1600 Afternoon Tea

1600-1730 Sub-Regional (e.g. Melanesia/Micronesia/Polynesia) discussion groups.

**WEDNESDAY 5 OCTOBER 1994****Item 4: Developing a Strategy for Climatological Cooperation in the Pacific Region**

*Chairperson: Mike Ariki*

0830-0930 Programme Coordination Activities

*(Update on activities toward a coordinated Regional Climatological Cooperation Programme)*

0930-1030 Framework for Regional Climate Cooperation.

*(Discussion on practical ways of enhancing regional cooperation on climate issues)*

1030-1100 Morning Tea

1100-1220 Discussion and drafting of meeting recommendations

1220-1230 Meeting Close

## Annex 2: List of Participants

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Valerie TAYLOR-BOULADON  
 Interpreter

Sabine BOULADON  
 Interpreter

### Annex 3: Opening Address

*Mr Poseci Bune (Fiji), Permanent Secretary for Tourism and Civil Aviation.*

- Chairman
- Distinguished guests
- Ladies & gentlemen.

On behalf of the government and people of Fiji, it is my pleasure to welcome such a distinguished group of visitors to our shores. I hope that you will enjoy your visit to our beautiful islands, and during your deliberations, you will find time to sample some of the local hospitality.

As the senior representatives of the Meteorological Services of your countries, your role is important to the safety and prosperity of our people. Agriculture, fishing, forestry and tourism are the foundations of the economy of Pacific Island Countries, and each is subject to the vagaries of the weather. We rely on your diligence and dedication to ensure that we have adequate warning of storms and hurricanes, and sound information to develop our economic plans.

We know only too well the disruption and devastation that mother nature brings when her mood is not so kind. Here in Fiji we are still recovering from the furious winds and seas caused by tropical cyclone "Kina" in January 1993. Of course our fellow Pacific islanders, both north and south of the equator also have their own tales to tell. While we cannot prevent such brutal events in the future, the information provided by meteorological services in such times of disaster allow us to protect our property, and significantly reduce the number of injuries and deaths.

I would like to think that I speak on behalf of all governments when I say that the service you provide is valuable, and it is in the best interest of us all to ensure that you have the necessary resources to perform your tasks at a consistently high standard. Here in Fiji we will continue to provide all available assistance to our Meteorological Service here in Nadi.

I must express my own personal gratitude to that of the people of the Pacific islands in acknowledging the role of our regional partners who provide financial and technical support to the area of meteorology. In particular, I would like to single out New Zealand for assisting with staff and technical assistance here in our Nadi office, Australia for the initiative in funding and establishing the sea level monitoring stations in 11 Pacific Island States to monitor climate and sea-level changes, and France for funding this meeting. We trust this partnership will endure into the future.

I also believe that scientists are predicting that the so-called el-nino effect may be with us for the fourth consecutive season. The eyes of weather scientists the world over continue to watch the Pacific region, as many of the keys to unlocking the secrets of the world's climate are hidden in this region. If so, we look to you people for help in these regard.

Fiji is proud to host your meeting. I hope your deliberations over the next few days will be fruitful, and may your conclusions lead to continuing improvements in the weather services of this region for the betterment of all Pacific islanders.

*Vinaka vaka levu. Ni sa moce.*

## Annex 4: SPREP Statement

*Mr Donald Stewart, Deputy Director, SPREP.*

Mr Poseci Bune, Permanent Secretary for  
Tourism and Civil Aviation;

Mr Eisa Al-Majed, Regional Director, Regional  
Office for Asia and South West Pacific, WMO;

Diplomatic Representatives;

Representatives of The Government Of Fiji;

Distinguished Delegates;

Ladies and Gentlemen.

On behalf of the Director of SPREP, I welcome you all this morning to the Second SPREP Meeting of Regional Meteorological Service Directors. Many of you will recall the first of these meetings which was held in Port Vila almost a year ago. It is encouraging to see that so many of you are here again to further the progress made at that meeting, and in the intervening period.

The broad goal of SPREP is to facilitate the sustainable management of the environment in the Pacific Islands. Many of the scientific authorities predict that the continued emission of so called "Green House Gases" into the atmosphere will lead to higher atmospheric and oceanic temperatures, and in accompanying rise in sea-level. The 19th South Pacific Forum in Nuku'alofa, Tonga in 1988 included in its communique the following statement:

"The Forum expressed concern about climatic changes in the south pacific and their potential for serious social and economic disruptions in countries in the region." The impacts of climate variability continues to concern the political leaders of the region, and discussion of this issue has featured in subsequent forum meetings. To address these concerns, the member governments of SPREP have given it a clear mandate to coordinate and implement activities to address regional impacts of global climate change and sea level rise, as well as a number of other areas of environmental concern.

If we are to understand the implications of climate change, we need to first understand climate. It is important to remember that climate change is a climatic phenomena, and meteorology, of which climatology is a sub-set, has a fundamental role in addressing these concerns. In this light, we look to you people, the senior representatives of the meteorological services of the region, to play a significant part in planning and managing our shared future.

The first meeting in Port Vila came out with a number of useful recommendations. With financial assistance from the government of New Zealand, a number of activities were implemented by SPREP as a follow up to these recommendations. Through the course of this meeting you will hear reports on these activities. They do however, confirm that, by and large, the climate network in the pacific remains fragile. Much more is still to be done to ensure that all countries of the region have established climate services and associated policies on climate.

During the deliberations of this meeting I ask you to consider the problems the region faces, and be aware that you will be asked to prepare recommendations at the end of this meeting that will guide future cooperation. In particular, SPREP is looking to you for guidance as to how the cooperative process should be managed. The future of meetings such as this one is contingent upon adequate funding being available from interested donors. Some questions you might ask yourselves are;

- are such meetings necessary for regional co-operation?
- are governments willing to provide money toward a regional meteorological cooperative?
- what areas require coordination, and what areas do not?
- what degree of formality do we need to provide the level of co-ordination desired?

There is an urgent need for long term activities to provide security for meteorological services in this region to address the concerns expressed. The present, meetings such as this one convened by SPREP are much needed, and I believe SPREP will continue to play an important role in the facilitation of regional cooperation in the area of meteorology. SPREP has the staff and resources to continue its role as a focal point for climate concerns, but the time has come for governments to forge closer relationships regarding the exchange of meteorological information in the region. I urge you to think carefully about how we all can ensure that the labours of our collaboration result in the maximum benefit to those we serve.

To conclude, I would like to acknowledge the government of France which has kindly provided the financial support to bring many of the Pacific Island delegates to this meeting; the government of Fiji, and particularly the Director of the Fiji Meteorological Service, Rajendra Prasad, and his staff, who have helped in the convening of this meeting. I also acknowledge the support of the World Meteorological Organisation in the convening of this meeting, and hope that our close working relationship continues into the future. The Vaisala Company has again provided financial assistance for this meeting, and their assistance is greatly appreciated. On behalf of the SPREP Secretariat, I wish you all a productive and enjoyable meeting.

Thank you.

## Annex 5: WMO Statement

*Mr Eisa Al-Majed (WMO)*

Mr Rajendra Prasad, Permanent Representative of Fiji with WMO, The Permanent Representative for Civil Aviation and Tourism,

Mr Don Stewart, Deputy Director of South Pacific Regional Environment Programme,

Distinguished Guests and Delegates,

Ladies and Gentlemen.

On behalf of Professor G.O.P. Obasi, the Secretary-General of the World Meteorological Organisation, it is a privilege and an honour for me to take part in the opening ceremony of this meeting. Allow me, first of all, to convey to you the greetings of the Secretary-General of WMO and his best wishes for the success of this meeting. I would like to welcome Dr. S. Karjoto, the President of Regional Association V, the South-West Pacific.

This is the second meeting of the Directors of the Meteorological Services of SPREP Member countries and Territories, to which WMO is invited to participate. WMO is appreciative of the kind invitation and over the brief period we are pleased at the strengthened cooperation with SPREP. In this connection, I am pleased to inform you that the WMO Executive Council at its forty sixth session in June this year, welcomed the establishment of working arrangements between WMO and SPREP to facilitate the effective attainment of the objectives set forth in their respective constituent instruments, and to act in close cooperation and consult with each other in regard to matters on common interests.

As you are aware, WMO organised the Familiarisation Meeting of Directors of National Meteorological Services of Non-Members of WMO in Noumea 18-24 May 1994, in which all Directors present here participated. They also actively participated in the eleventh session of Regional Association V which was held in Noumea from 18 to 28 May 1994.

In the next few days all or most of you will participate in the fifth session of RA-V Tropical Cyclone Committee which will meet from 5 to 11 October 1994, followed by the Workshop for Senior Meteorological and Disaster Prevention Officers from the South Pacific Region which is co-sponsored by WMO.

Mr Chairman,

The Small Island States in the South Pacific are considered particularly vulnerable to natural disasters and the threat from the consequences of global warming, especially sea-level change. The most devastating of natural disasters in the case of these States in the Pacific are the tropical cyclones and the associated floods and storm surges. These disasters not only result in great loss of lives and severe damage to property, but also cause great setbacks to the development of the countries with small economies.

Every single observation from this area is valuable. The basic level of observation and telecommunication infrastructures in the Meteorological Services of these countries and efforts made for their improvement need to be maintained. In this connection, I would like to touch on a few issues which this meeting might wish to consider as you deliberate on ways to strengthen the national Meteorological Services of this sub-region. There is a strong need to:

- Strengthen the network for the collection and exchange of data and information
- Improve the weather forecasts, especially tropical cyclone warnings for the protection of life and property.
- Strengthen and increase training in various fields of meteorology, operational hydrology, climatology and related activities.

I should like to assure that WMO will cooperate fully with SPREP in the spirit of our working arrangements in addressing these important issues, especially those arising in UNCED follow-up and in particular those taken up by the UN Conference on Small Island States held in Barbados in May 1994. In this respect, it is my hope that this meeting will develop ways and means of addressing the major priority areas of concern, so that an appropriate strategy can be worked out.

I wish you all a successful meeting and a most pleasant stay in Fiji.

Thank you.

## Annex 6: National Review Summary Reports

### Australia

The Australian Director of Meteorology Dr John Zillman is unfortunately unable to attend this meeting due to a previous commitment to visit Russia. They asked me to tender his apology and convey his wishes for a very successful meeting.

Firstly I would like to draw your attention to two recent publications prepared in Australia.

The Bureau of Meteorology has the responsibility for several important climate related matters, including the collection and archival of data, data services, climate monitoring and applications. The Bureau is also strongly involved in climate research. At the direction of the Australian Government the Bureau has prepared and published (March 1993) the first of a series of Annual Summaries of Australian participation in international scientific climate programmes.

The Australian Dept. of Environment Sport and Territories (of which the Bureau is part) has the responsibility of coordinating environmental aspects of climate change, and very recently coordinated publication of Australia's National Report under the Framework Convention on Climate Change.

The above two documents contain much useful information relevant to international climate issues.

As foreshadowed by Dr Zillman a year ago, considerable progress has been made on a AIDAB supported project to upgrade basic meteorological networks in the Pacific. Ms Dawn Thistlethwaite will be reporting on this later in the meeting. Two CLICOM training courses have also been conducted. These activities relate to recommendations from the 1991 report "The Changing Climate in Paradise".

The current El Nino-Southern Oscillation (ENSO) event across the Pacific is now seriously affecting Australia and a number of our neighbouring countries. Some areas of Eastern Australian are experiencing their fourth consecutive year of ENSO-related drought. Such events emphasise the common interest Pacific countries have in climate.

The Bureau of Meteorology looks forward to continuing close cooperation with countries in the South Pacific to develop the most effective meteorological services possible.

## Fiji

The Fiji Meteorological Service (FMS) operates as a department under the Fiji Government. It has four divisions including the Weather Forecasting Division and Climatology and Special Services Division. Within the Department, there are 88 established posts of which 15 are professional positions, 5 presently occupied by expatriates from New Zealand and Australia. A staff training programme is in operation with the aim to localise these positions within the next 4 years. Assistance is being provided by New Zealand and Australia in this regard. In addition to these regular staff there are many co-operative voluntary observers working at rainfall and climate stations, although the number of these voluntary observers is constantly declining like in many other countries.

Besides its responsibility to serve weather and climate needs of all social and economic sectors of its own country, the FMS also provides regional services. These include the operation of the Nadi Tropical Cyclone Warning Centre (TCWC), the provision of aviation weather services for the Nadi Flight Information Region and marine weather services for a very large part of the South Pacific, acting as a hub for telecommunication and exchange of meteorological data, and recently the provision of training for observers from meteorological services of other island states.

The Nadi TCWC has been proposed as the Regional Specialised Meteorological Centre (RSMC) within the World Weather Watch system of the World Meteorological Organisation (WMO). A demonstration of Fiji's capabilities and facilities in this regard was carried out quite successfully at the last meeting of the WMO Commission for Basic Systems (CBS) in August 1994. The only requirement now for Fiji is to establish a proposed telecommunications link with Australia for access to Numerical Weather Prediction and other data and products necessary for efficient operation of the RSMC. This will be accomplished soon.

The FMS operates 13 synoptic stations (fully manned and reporting at least three hourly), 11 of which are in the Regional Basic Synoptic Network (RBSN), with another four part-synoptic ones (reporting during daytime only) operated by other agencies. Additional data is supplied to it by cooperating network of about 70 rainfall stations and over 30 climate stations. Most of the instrumentation in these stations is provided by the FMS which also caters for the training needs of the observers. There is an upper-air station at Nadi that makes radiosonde observation once a day at 00z and radiowind observations twice daily at 00z and 12z. A separate network of about 150 rainfall stations is operated by the Hydrological Section of the Department of Public Works.

The Service has two newly installed weather radars; a 5cm wavelength dual-purpose radar, for windfinding and weather surveillance, at Nadi Airport and a 10cm wavelength radar dedicated to weather surveillance at Nausori Airport. It also has satellite receiving systems for GMS S-VISSR and WEFAX (GMS & GOES).

Nadi is connected with 14 neighbouring island states including non-Member countries of WMO through the shared GTS/AFTN regional telecommunication circuits. The Nadi AFTN automatic message switching centre is equipped with the French "SAGEM 2000" system and can accommodate circuits with speeds up to 9600bps. Software for GTS/AFTN interface is also available within the system to accommodate the planned establishment of a GTS link between Nadi and Melbourne, and also to cope with most communications in this region which are implemented through AFTN.

The Climatology Division of the Department is the smallest with least resources. Manned by five staff, with only two professional positions, the Division's activities are currently limited to data entry and archiving, developing some basic user products and largely attending to the growing number of private sector and public enquiries. A daily climate summary system is operated on a PC for data from most of Fiji's synoptic stations and a few co-operating stations. A monthly report detailing the weather sequence, unusual events, element extremes and water balance, together with description of month's weather and climate is obtained using the system.

The CLICOM system, which was initially acquired in 1988 under a WMO/VCP project, has only recently been made operational with routine data entry now taking place. The full potential of the system is yet to be realised.

The Service has set up a comprehensive set of information publications covering station summaries, meteorological element summaries, analyses of extreme rainfalls and wind gusts, public information and advice on tropical cyclone, etc. Some regular publications include a monthly weather summary (weather and climate events with summary of the month's data), annual weather summary (notable weather and climate events with annual data summary), and individual cyclone reports (history, warnings, effects and tracks of all tropical cyclones occurring in the Nadi area of responsibility). It is planned to issue seasonal cyclone summaries with verification results from the forthcoming season.

The FMS is committed towards providing weather forecasting and warning services for the entire region and in constantly considering ways of improving these services to meet the growing demands of the many countries it directly serves. For example, tailored marine forecasts will soon be provided to a few of the countries, as desired. There are also plans to upgrade the Service's observer training capabilities and facilities to accommodate the increasing needs of these countries.

There are a number of projects pending approval, including substantial proposal made to the Japanese Government early in 1994 for upgrading of the Nadi Centre's capabilities and facilities with respect to the RSMC operation. It includes a new building complex for the entire Service, computer upgrade to handle the various data functions, installation of Automatic Weather Stations to replace some remote manually-operated ones and supplement others, and new satellite receiving and processing systems for high resolution geostationary and polar orbiting meteorological data.

The primary objective over the next few years would still be to develop forecasting services so as to meet the needs of an RSMC. There is no doubt however, that climatological services would need to be expanded to satisfy the ever increasing demands of the private and public sectors alike. Gradually, as automation takes place in the forecasting arena, more staff would be deployed in the Climatology Division to serve these needs. Monitoring climate and climate change, and developing forecasting mechanism(s) for the short to medium term climatic variation will be of high priority.



## French Territories (Wallis & Futuna, New Caledonia)

### 1. General Introduction to Météo-France

Météo-France is the French National Weather Office. It exercises its activities in France and abroad.

In 1993 it experienced a major transformation which saw it change its status from Government department to public corporation. This transformation now allows it to charge some of its clients for services. Without being totally commercial in its operation, it nonetheless is able in this way to subsidise the considerable cost of the observational networks and operational equipment involved in forecasting the weather.

Total personal is around 3000, most of whom are of Class I and II.

It comprises five main divisions:

- the Head Office (Paris),
- the Ecole Nationale de la Météorologie (National School of Meteorology, ENM) in Toulouse, which trains all Météo-France staff,
- the Centre National de la Recherche Météorologique (National Meteorological Research Centre) in Toulouse (250 people),
- the Service d'études des Techniques Instrumentales de la Météorologie (Department for the Study of Technical Meteorological Instruments) at Trappes, near Paris.
- the Service Centrale d'Exploitation de la Météorologie (Central Meteorological Processing Office, SCEM, in Toulouse), which is responsible for analysis and forecasting within France, and manages Météo-France's resources for its more complex data processing.

It also contains divisions operating at a Territorial level:

- the seven Inter-regional Offices within France, and a division in each of the French Overseas Territories or Departments:
- the Direction Interrégionale (Inter-regional Office) of the Antilles and Guyana, in the Carribean,
- the Direction Régionale (Regional Office) of Reunion in the South-West Indian Ocean,
- the Mayotte Service Météorologique (Meteorological Service), in the Mozambique Canal,

- the Saint-Pierre and Miquelon Meteorological Service in the North Atlantic,
- the Regional Office of French Polynesia in the South-West Pacific,
- the Meteorological Service of Wallis and Futuna in the central South Pacific,
- the Regional Office of New Caledonia and Wallis and Futuna in the South-West Pacific.

### 2. Organisation of Météo-France in the Pacific

There is no one regional organisation for the whole Pacific; rather there are two Regional Directors in French Polynesia and in New Caledonia, the latter also being responsible for Wallis and Futuna. Regional, international or European matters are handled by a special department of the Main Office of Météo-France in Paris.

### 3. New Caledonia and Wallis and Futuna

Météo-France's management chart for these two French territories is provided in an Appendix.

The Regional Office has a staff of 95, 25 of whom come from France. The remainder are all recruited locally and trained at the ENM (National School of Meteorology) in Toulouse.

The Wallis and Futuna Service employs 13 officers.

The Regional Office at Wallis and Futuna is completely funded by Météo-France. The Territory of New Caledonia, which functions as a fully independent unit in meteorological matters, contributes 10% of the cost of running the Regional Office in this territory.

The Processing division incorporates all the stations of the Regional Office:

- two synoptic aerodrome stations - at La Tontouta, at international airport (10 officers), and at Magenta, a domestic airport (5 officers);
- four synoptic stations: Noumea, which is also a radiosondage station, Koumac, in the far North of the Grande Terre (4 officers), Poindimié on the East Coast with its unique climate (2 officers), and Lifou, the largest of the Loyalty Islands (3 officers).

The important Forecasting and Transmitting division has 5 forecasters, all Class I. They work from 4.00 hours to 21 hours daily, and around the clock when there is the threat of cyclones.

The seven transmission specialists are responsible for the proper functioning of the various telecommunications systems of the Regional Office.

An entire department of 10 officers is allocated to climatological matters. Its prime responsibility is to ensure the quality of measurements fed in from the various observational networks, and to submit them to rigorous examination. They are also responsible for the subsequent long-term archiving of this data and, where appropriate, of its publication. A development division adapts computer applications provided from France to local needs, as well as developing computer facilities necessary to meet local requirements.

The Bureau d'Etudes et de Développements (Research and Development Department, 3 officers), is responsible for developing the computing and telecommunications aspect of processing, as well as for adapting telecommunications systems to local needs.

The Physical Resources section is responsible, through its Maintenance division, for the proper functioning of all the observational networks and telecommunications equipment. This division is staffed by six technicians, all extremely well-qualified in electronics and meteorology.

#### 4. *Observational networks in New Caledonia*

There are summarised in the map provided in the Appendix.

The six synoptic stations are distributed over the whole of the Territory.

The network includes 15 automatic stations, six of which are connected to the telephone system. It is thus possible to call them every half-hour if necessary, which constitutes an excellent small-scale tool for monitoring cyclone activities affecting the Territory.

The network also contains measuring posts maintained by volunteers. These agrometeorological posts provide the data required to measure evapotranspiration and the hydrous level of the soil. The climatological stations measure rain, temperature and wind. And finally, there are 45 pluviometric stations, providing a good account of daily rainfall over the territory.

In 1993, the Regional Office re-established three stations in remote uninhabited islands: Surprise, which lies 600 km to the North of New Caledonia; Chesterfields, 800km to the North-East; and Matthew, 400 km to the South-East. Data from these stations is transmitted every three hours by the Japanese GMS satellite, and reaches Noumea in less than a minutes. Transport to these islands is provided by ships of the New-Caledonian Armed Forces; without their support, it would be impossible to utilise such sites for meteorological purposes.

A rainfall radar with a 5cm wave length, was set up in Noumea in 1978. Funds have been procured to install another radar near Koumac, operating in 10cm with Doppler signal. It is expected that it will be in operation in two years' time. Its position in the North of the Territory means that it will be very useful in tracking cyclones threatening New Caledonia or the South of Vanuatu.

#### 5. *Telecommunications and processing resources in New Caledonia*

A diagrammatic representation is provided in the Appendix.

The Regional Office has a local computer network to which all its equipment is connected.

The heart of the communications system in Noumea is TRANSMET, which is specially designed to handle meteorological link-ups of any type. It is able to recognise the identifying Header of messages, such as defined by the World Meteorological Organisation and directs messages to the appropriate channels by means of an Header dictionary. It checks the syntax of the messages and allows for manual corrections if there are mistakes.

TRANSMET is connected to certain specialised services:

- the Bureau of Meteorology (BoM) in Melbourne (9600 bauds); it is part of the GTS (Global Telecommunication System).
- the Météo-France Centre is Papeete (4800 bauds); a major part of data available in French Polynesia now comes from Melbourne via Noumea.
- the aerodrome stations of Magenta and La Tontouta.

The TRANSMET system is connected to the French public data transmission network TRANSPAC. Through this channel, the Noumea Centre receives data from the synoptic stations in New Caledonia and can connect with the SCEM in Toulouse in order to receive high-resolution numerical predictions from the European Centre at Reading. It also allows certain data from the Pacific region to be transmitted to the SCEM in a few seconds rather than the excessive length of time it would take through the GTS.

The SYNERGIE system is the forecasting assistance computer programme currently being extended to all Météo-France forecasters. It can receive a wide variety of data (readings, satellite images, numerical predictions, etc) and summarise them in graphic form as an aid to forecasters. This system processes the numerical predictions from the European Centre as well as those received, via Melbourne, from Washington and Bracknell.

An APT/WEFAX system for receiving low-resolution satellite pictures, has been installed in Noumea. In November 1994 an HRPT system will be added to receive high-resolution pictures from orbiting satellites. This will be the only station of its type installed in the South Pacific.

The Noumea Centre is particularly pleased to have a terminal for processing DIFACS images transmitted by the Melbourne BoM. With this it can access satellite pictures and avianational maps, as well as maps derived from Australian digital predictions. All these documents are of very high graphic quality.

The Noumea Centre makes extensive use of the fax machine for distributing its output, and for special alerts. By late 1994, an automatic multi-diffusion system will be in place which will also function as a server that users can contact to receive a range of graphic documents or reports.

#### 6. *Météo-France's services in New Caledonia*

The Regional Office broadcasts daily three weather forecasts for the general public, two for shipping in a zone extending 200 miles from New Caledonia and Vanuatu (see map in the Appendix), and three for aviation.

There is also available a daily forecast for agricultural use. It provides, where necessary, useful information during periods of drought.

Forecasts for the general public and shipping are available by answerphone.

In bad weather conditions, particularly where there is the threat of a cyclone, special forecasts are prepared for the general public, ships and pleasure craft, and Emergency Services.

The Regional Office is also responsible for assisting aviation. This service is paid for by a system of charges against the airlines.

It also assists the Armed Forces where required.

It devotes particular attention to the televised weather forecasts prepared through sub-contracting to companies specialising in image-processing and computer presentation of television programmes.

#### 7. *Cyclone warnings in New Caledonia*

These only relate to systems which have at least attained the level of "moderate tropical depression", i.e. which are associated with winds equal to 48 knots or more.

A "warning zone" has been defined (see map in the Appendix). As soon as a system enters this zone, an "early warning" is set in motion. If it seems certain that the system will reach the territory in less than 24 hours, a first alert is then set in place. At this point, educational institutions close and a Civil Defence command post is set up in the Central Police Station in Noumea. When the system is no more than 6 hours away, a second alert is declared. All safety precautions should by then have been taken and everyone is required to remain indoors.

#### B. *Past and present research in New Caledonia*

The AUREHLY application for analysing meteorological fields with respect to landform, is presently being installed in Noumea. It will be particularly useful for mapping rainfall which, in New Caledonia, is very much influenced by the central mountain chain of the Mainland.

There is a dry season in New Caledonia each year from July until December. For the last three years, no doubt as a result of the exceptionally prolonged El-Nino effect that we are experiencing, there has been continuous drought, causing serious damage to crops and stock. The Research and Development Department of the Regional Office has undertaken an exhaustive study of droughts affecting New Caledonia since 1950 and a complete climatology of the phenomenon has been developed. Criteria for determining the commencement, intensity and duration of droughts, have been isolated. The likelihood of consecutive days without rain occurring has been calculated (see chart in the Appendix).

Météo-France's Regional Offices in the Pacific have combined with the National Institute for Water and Atmosphere (NIWA) in Wellington to produce a database of previous climatological statistics for the whole of the South Pacific area, their contribution was to provide data for the French Territories. This database revealed a significant temperature increase in New Caledonia and in Wallis (see Appendix for graph). The relation between temperature change and the Southern Oscillation Index was also examined (see attached map). In 1995, data on atmospheric pressure and nebulosity will be added to determine, for example, whether temperature change recorded is not the result of increased sunshine.

Every year, the Regional Office produces a summary of cyclone occurrences monitored in the whole South Pacific region during the cyclone season. The summary includes a description of the path of each cyclone tracked and, where appropriate, an account of its effect on New Caledonia. An English-language edition of this document was produced for the first time in 1994.

A computer model using digital simulation of cyclo related-tidal extremes has been developed by the National School of Meteorology in Toulouse. This model is now used in Guadeloupe (Antilles). It is currently being installed in New Caledonia. We expect to be able to use it to create a map of the tidal risks associated with cyclones, and to predict their probability.

#### 9. *Organisation and activities of Météo-France in Wallis and Futuna*

The Wallis Department is the most remote from the Head Office, to the extent that the person in charge sometimes feels like Météo-France's Officer Number 3000.

As in the case with many other Pacific states, the Wallis department suffers from the lack of proper means of communication.

Its only connection is with the RSFTA (AFTN) network. This causes problems insofar as several members of the network, such as American Samoa and New Zealand, are unable to receive avianational weather information, even though this information is explicitly intended for them. The Service in Nadi has already had to resolve a similar problem for Vanuatu and even so it would seem that the result is not entirely satisfactory. Hence, any proposal to improve transmission systems in region V would be of considerable interest to the Service in Wallis.

A RI U transmitter/receiver is utilised for communication between the two stations of Wallis and Futuna. This is a very flexible system and proved to be particularly valuable in March 1993 during the earthquake which ravaged Futuna, since it remained the only means of communication with the army until the telephone link was re-established. It is similarly used as an emergency communication with the Regional Office in New Caledonia.

With respect to equipment, there are plans to install, in a first phase, APT/WEFAX satellite equipment, with automatic stations to follow later.

This modernisation will automatically entail the presence of a specialist on Wallis to ensure maintenance, since it is at present undertaken from Noumea, 3000 kilometres away.

The Service on Wallis has the benefit of all the computer programme modifications effected in New Caledonia or French Polynesia. The Euclide programme, for example, for handling climatological data, has been utilised on Wallis since May 1994. This allows the processing of data from the territory to be done locally for the first time. The Obs/Trans programme, however, used by observers to code and transmit information, is unfortunately unable to be run to capacity because it is still necessary to perforate paper strips with an old teleprinter before transmitting on the RSFTA network.

The Futuna station is still not computerised.

The preparation of forecasts requires the use of documents received by radio-facsimile:

- from Honolulu (neph analyses and cloud flow lines to within 48 hrs of the 1000 (hPa level).
- from Wellington (analytical charts and forecasts for area and altitude)
- or from Nadi (unciphered forecasts) through the RSFTA network.

The staff consists of three technicians two of whom come from France (Class II), with the third being recruited locally. All three officers are qualified to make forecasts. There are also four observers on Wallis and three on Futuna, as well as a maintenance person on both Wallis and Futuna.

An observer from Wallis is currently on a nine-month training course at the ENM (National School of Meteorology) in Toulouse. This training will provide the qualifications necessary for the observer to undertake forecasts. There is also ongoing staff training organised locally in New Caledonia.

Although the Météo-France Service on Wallis is attached to a modernised Regional Office, it is still expanding and periodically experiences, because of its isolation and insularity, similar problems to those experienced by neighbouring States.

#### 10. *Météo-France's regional role in the Pacific*

At the present time, Météo-France does not have a regional policy for the Pacific. Its regional offices are principally concerned with developing the meteorological services of French territories in the Pacific with a view to ensuring their long-term viability. They must also meet France's commitments in the Pacific with respect to the OMM (WMO) and, especially, take an active part in the World Weather Watch programme.

Over the last four years, Météo-France's Regional Offices have achieved a significant upgrading of equipment, in combination with a major staff-training programme. As a result, the French meteorological services in the Pacific would appear to be the most modern and powerful of the islands of the region. They have achieved a high standard of performance in domains such as the establishment and operation of networks of automatic stations, the application of electronics to meteorological measurements, computer systems, data processing and telecommunications.

They are therefore in a position to provide valuable assistance to the services of other Pacific States, which are consistently voicing their needs in these areas.

Météo-France's willingness to transfer responsibility for the contribution of Regional Offices to meteorological activity in the Pacific directly to the offices themselves, is in keeping with the current desire to establish French territories of the Pacific firmly within their regional environment.

### *The Territory of the Wallis and Futuna Islands*

Fewer than 15,000 inhabitants occupy this French Territory in the Pacific where more than 50% of the population is under 20 years of age; a further 15,000 or more Wallisians and Futunians live in New Caledonia, as discussed below.

Questions concerning the environment constitute one of the major areas of concern for Monsieur Legrand, Prefect, and Senior Official for the Territory, as well as for local representatives. For example:

- the June 1993 recommendations of SPREP have been the subject of a by-law forbidding the capture of marine turtles and the sale of their by-products.
- in 1992 and 1993, the Agricultural Division (Services de l'Economie rurale) created a dump to receive household rubbish, using a technique designed to protect the water table.
- increased emphasis has been placed on the installation of septic tanks in several areas on Wallis.
- and with respect to the coastal area, work recently begun on a marina has been suspended because an environmental impact report was not commissioned before commencement.
- the planting of pine trees begun a quarter of a century ago, now provides several hectares of forest in an area on Wallis formerly labelled as "Toafa" or desert.

On the other hand, the fact that a large number of the inhabitants of New Caledonia who are of Wallis or Futuna origin could possibly return en masse because of the uncertain political future of New Caledonia after 1998, could become a major cause for concern, particularly as far as water resources are concerned.

If appropriate, some form of representation at the meeting of the Heads of Meteorological Services would at least be an indication of the interest that our Territory bears in the activities of SPREP.

## Federated States of Micronesia

### *FSM Weather Service Office Programmes and Operations*

There are three (3) first order stations operating within FSM states, namely Yap, Chuuk and Pohnpei States. The first order station operations are twenty four (24) hourly and all special microcomputer-aided paperless surface observations (MAPSO), and two daily microart-upper air observations ensuring production of accurate and timely meteorological services for the international weather forecast centres, general public and private industry provides aviation pilot briefing services and flight folders to international and local air carriers and acquisition of surface and upper air weather data for international weather forecast centres and for supporting real-time aircraft and marine operations.

The coastal marine network (CMAN) stations have been installed by joint US Navy and NOAA/NWS on several remote atolls to provide via satellite hourly data on wind and pressure to aid the weather forecast centres.

The joint typhoon warning centre and Guam forecast centre, Honolulu, provide all cyclone warnings to first order stations to be disseminated to civil defence or disaster control offices and to the general public. Daily weather forecasts are currently entered into coadophone (automatic telephone system) twice a day for the general public.

The communication system of extel comwriter is operational at all first order stations in Micronesia, JTWC, Guam, and most of the US Pacific Region first order stations including American Samoa which we can see the real-time data disseminations. In addition, Hf voice dedicated frequencies within all first order stations for immediate contacts and back-up for the extel comwriter system. The Packratt system is also hooked to the HF system to use for back up within the stations.

There are 10 weather service specialists, one electronics programme specialists and maintenance man who are currently operating in each first order station. All synoptic observers are on contract basis and majority of the cooperative climate observers are volunteers.

The NOAA environmental research laboratory in Colorado USA has installed a wind profiler system in 1986 on Pohnpei and it is in operation to date. UH Honolulu and NOAA have numbers of tide gauge stations within FSM boundaries which are linked via satellite to their offices.

The University of Colorado has three radiation measuring system linked via satellite in operation in each of the 3 first order stations including RMR and RPB. Several Japanese scientists have installed magnetometer and other scientific measuring units in FSM selected sites which are in operation.

SPREP and National Tidal Facility of Flinders University of South Australia through funding by AIDAB have sponsored South Pacific Sea Level and Climate Monitoring Programme Workshop Round One (1) in Solomon Islands early this year and next round will be conducted in Nauru for the FSM participations and we appreciate it very much.

The WMO membership application is currently in preparation by the FSM Government and hope to be submitted to WMO this year for consideration. I appreciate to obtain all detail application procedures from the WMO delegates during this meeting.

On behalf of FSM Government I would like to extend my sincere appreciation to all the Governments and agencies for making my trip available to this important meeting. Also to all other originations, for generously extending to FSM National Government for the participation of WMO RA-V Meeting in New Caledonia and IPCC in Geneva. FSM National Government will do its best to fulfill the goals and objectives of all meteorological interests and climate change monitoring programmes to jointly minimise the future impact to the mankind and sustainable development programmes to our Pacific region and to the rest of the countries.

## Marshall Islands

Mr Chairman, Fellow Directors, Ladies and Gentlemen, I bring you greetings from the Marshall Islands.

I believe I have met most of you one year ago at the First Annual Meeting of South Pacific Regional Environment Programme which was held in Vanuatu.

We in the Marshall Islands are fortunate in that in our area most typhoons go in a direction away from us, but we do get lots of rain. Our climate is predominantly a trade-wind climate with trade winds prevailing throughout the year. Minor storms of easterly wave-type are quite common from March to April and October and November. The trades are frequently locally interrupted during the summer months by the movement of the zone of intertropical convergence across the area.

One of the outstanding features of the climate is the extremely consistent temperature regime. The range between the coolest and warmest month averages less than 1 degree. The average daily range is less than 9 degrees. Night-time minima are generally 2-4 degrees warmer than the average daily minimum because lowest temperature usually occur during heavy shower in the day time. The sky at Majuro are quite cloudy. Cumuli-form clouds are predominant, but altostratus-altocumulus and cirriform clouds are also present most of the time.

Mr Chairman, let me touch briefly on the history of the weather service in the Marshall Islands. The first weather service office was established in early 1952 by the United States Air Force. The operation then was only releasing unscheduled pilot balloon observations. At that time the surface observation programme is limited.

Two years later the United States Weather Bureau took over the operation. Between 1954 to 1975 there are many changes that took place in the workload as well as the time of operation. During this time the upper air observations and surface observations programmes improved and everything are done manually. In the Summer of 1975 the operation hours increased to 24 hours. At the present time these two programmes are already automated and call mapso programme and microart programme.

With new upgrade this time we gained advantages in accuracy and getting the message or observations transmitted on timely bases. There is one first order station in the Marshall Islands and five second order stations, one sawrs station, two mmis stations and two c-man stations. At this first order station we have the staff of ten (10) local trained people to run the station. We are very grateful to United States National Weather Service for the training of staff so that the weather service office now be able to manage by only Marshallese citizen.

Let me go further more and mention briefly on the status of becoming a member of WMO has now in process at the national level. A cabinet paper has been initiated by the Chief Secretary and I was told before coming to this meeting the application will be ready before the end of this year. I believe that a direct communication from the Secretary-General of WMO to the President or this Minister of Foreign Affairs will really speed up the process.

The South Pacific Sea Level Rise and Climate Monitoring Project in Majuro functioning properly and monthly publication received on timely bases. The solar monitoring station and the University of Hawaii tide station are operational.

More demand in obtaining immediate satellite weather data for airlines and ships operating in our area and at the present time a need of better satellite receiving process is a high priority.

The RMI Government believes that the Pacific Islands Nation must work together in order that this process could be effective, assistance for the following are humbly seeked:

1. Provide funding to implement training programme for a Climate Officer. This person will be responsible for collation and analysis of climate for planning and development purposes and he will work closely with WMO, SPREP and other regional agencies.
2. Implement and provide funding in training of personnel and regards to new technical equipment for use in forecasting and climate monitoring.

In conclusion I would like to extend our gratitude to the Director of SPREP, WMO Representatives in their consideration of RMI Government delegate to this meeting. And I hope that the benefits I accured will uphold the closer relationship between SPREP, WMO and Marshall Islands to an unlimited time.

Thank you for your attention.

## New Zealand

*David Roberts, Pacific Manager, Meteorological Service of New Zealand Limited*

During last years SPREP Meeting of Directors of Meteorological Services, the Chief Executive of the Meteorological Service of New Zealand Limited (MetService) Mr John Lumsden, provided a summary of our new structure, its operations, and our involvement in climate change areas. It may be more useful for this meeting therefore if I provide an update of the present situation in New Zealand in respect of climate programmes and other issues.

- John Lumsden has appointed Dr Don Thompson as Climate Advisor to the Permanent Representative of New Zealand with WMO. The Climate Advisor will be involved with the liaison and coordination of WMO and climate issues for MetService. This will include our involvement with universities, the Ministry of Foreign Affairs and Trade, the Ministry of Sciences, Ministry for the Environment, and the many other organisations and agencies involved in these areas. This appointment helps focus climate change issues, ensuring we are fully informed on progress and activities. MetService continues to have the benefit of Professor Paul Mosley's advice as Hydrological Advisor.
- New Zealand is a signatory to, and has ratified the recent Framework Convention on Climate Change (FCCC). Significantly, this Convention requires parties to (amongst other things):
  - "support and develop international and intergovernmental observation programmes"
  - and
  - "support efforts to strengthen research and observational capabilities within developing countries".
- There has been considerable activity in respect of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC), with New Zealand providing significant support to this programme. IPCC outcomes have important inputs to FCCC issues, and national climate change policies. The Ministry of Research, Science and Technology coordinates these activities in New Zealand.
- New Zealand has further been involved with the International Global Biosphere Programme of the World Climate Research Programme. Professor John Hay of the Auckland University was on contract to consult with various Pacific Island, Australian and New Zealand organisations regarding the possible development of an Oceania START centre or network. START stands for System for Training, Analysis and Research, Professor Hay's report is with the Australian Academy of Science for consideration and possible implementation. The Academy is yet to release the report. Professor Hay advised he has placed emphasis equally upon the socio-economic aspects of such research in addition to the purely scientific issues in his study.
- Several other New Zealand projects are already recognised within IGBP.
- The World Climate Research Programme (WCRP) provides a complementary focus to the IGBP, and is focused on the physical and meteorological aspects of the climate system. MetService maintains the formal link to WCRP through the permanent representative to WMO, John Lumsden. New Zealand has been involved in several projects under this programme. World Ocean Circulation Experiment, Tropical Oceans Global Atmosphere Programme, and Global Energy and Water Cycle Experiment.
- The New Zealand Government has recently allocated additional funds for international science, and this is likely to be available for business type meetings and organisational activities. The Ministry of Research Science and Technology is managing these funds.
- A joint Australia-New Zealand conference is to be held in Wellington later this month to discuss matters relating to assessments of climate change science, impacts, and policy issues. Called "Greenhouse '94" this conference perhaps highlights the level of cooperation and scientific coordination present in this field.
- New Zealand participated in the second Tokyo meeting concerning the establishment of an Asia-Pacific Network for Global Change Research earlier this year.



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- With the increasing use of CLICOM in Pacific nations, attitudes towards central archiving of data is an issue requiring address. National Institute of Water and Atmosphere's (NIWA) decision to change the basis for retaining all records indefinitely requires further discussion.
  - MetService suggests greater emphasis on the application of CLICOM products and services would be very beneficial to Pacific region nations. However, as will be discussed in a later paper, we also suggest a much greater effort in terms of *in-country* training for the set-up and basic operation of CLICOM is required.
  - Training - most training has a significant two way benefit, to both the recipient, in terms of increased knowledge and abilities, and to the region in terms of improved quality of data and services. Accordingly, MetService New Zealand will continue wherever possible with training courses for technical, observing and forecasting services.
  - In respect of climate issues and training, MetService and NIWA are coordinating activities as appropriate. These issues will fall within the country programmes for MetService, and individual project activities for NIWA. We believe MetService continues to be well placed to provide continued input for such matters.
  - In more general terms of Pacific involvement, MetService will continue to provide an appropriate level of support throughout its Pacific Programme. This involvement will be discussed in more detail in a separate address. The contributions made under this programme are significant in terms of the WMO/ICSU programmes now coordinated into GCOS.
  - MetService continues as the provider of weather forecasts under contract to the New Zealand Government. Ongoing performance measuring exercises have confirmed our forecasting competence is very high. These performance measures include such statistics as the Probability of Detection and False Alarm Ratio for serious weather events.

## Palau

Palau Islands is comprised of high and low islands situated in the Western Pacific. Palau consist of about 350 islands with Babelthaob the larger and heavily forested. The other three high volcanic islands beside Babalthaob are Koror, Malakal and Ngerkebesang. Limestone Islands consist of Peleliu, Angaur and the Rock Islands. Kayangel, Tobi, Sonsorol, Meriil and Puloana are atoll islands.

Palau Island was the last trust territory of the Pacific Islands until October 1, 1994, when compact of free association with United States implemented.

Although, Palau is now freely associated with the United States, funding and operation of the Palau Weather Service will be remained under the responsibility of the US Government as stated in the agreement between the two countries.

The Palau Weather Service have a staff of 10, with 8 meteorological technician, one electronic technician and a tradesman. There are no meteorologists currently on station but we are now in process to send someone to take meteorological course at the University of Hawaii, hopefully by January next year. The student will return to the station upon graduation.

The objective of the Palau Weather Service is to provide weather reports and warnings to the community in order to minimise the loss of lives ad properties. These objectives has been made over the past years guidance and assistance from the JTWC, Guam. We are also getting some weather map from JMA via Japan GMS satellite.

All these data's collections are relied on a good communication system. Communication is an important tool in the collection and dissemination of reports. There is a clear need for an alternative link to ensure services are not disrupted, particularly during events such as tropical cyclone.

The weather conditions in Palau throughout the year is depended on the North-South seasonal movement of the ITCZ. Depending of the South and Northward movements of ITCZ, the Northeast trade and driest season come from November to May, and Northwest to Southwest wind and wettest season come in July to September.

The surface air temperature is 27-28°C throughout the year, though the maxima and minima occurred depending on the North and Southward movement of the sun. The annual range of temperature is about 1° C.

The prevailing wind direction is from Northeast to East from November to June, which is called the Northeast trade. The period from July to October, the winds flow from Northwest to Southwest direction. The two main wind direction occurs with the North-South movements of the ITCZ.

## Papua New Guinea

### Objective of PNG NMS

The primary of the PNG NWS is to contribute effectively and efficiently to the achievement of National Goals and Objectives through observations and understanding of Papua New Guinea Weather and Climate and the provision of Meteorological Services to meet Papua New Guinea's national needs and the international obligations.

### Structure and Status of PNG NWS

PNG NWS is a branch of the Department of Civil Aviation. Headed by the Director, (5) Assistant Directors, and twelve (12) Outstations OIC's.

### Staff

PNG NWS has a current total staff strength of eighty four (84) including one Contract Officer. Anticipated staff increase within the next five years is one hundred and fifty. The above staff strength falls under the five main sections:

These are

1. Policy and Administration
2. Facilities
3. Engineering
4. Forecasts and Warnings/Aviation Services
5. Climatology

### Forecasts and Warnings/Aviation Services - Port Moresby Office

This office incorporates the following activities:-

- (a) Forecasts and Warnings
- (b) Aviation Services
- (c) Public Weather
- (d) PNG Tropical Cyclone Warning Centre

The office has a staff of twenty four (24) covering a twenty four hour period. The staff break up is as follows:

1. Forecasters	6
2. Briefing Officers	3
3. Observer Grade 4	1
4. Observer Grade 3	1
5. Observer Grade 2 & Obs 1	12

In addition Senior Officers from Head Office are called in to assist in the Tropical Cyclone Watch and other Warning duties.

### Tropical Cyclone Warning Centre

The Centre operates on a twenty four hour basis utilising the above operational staff on shift, with additional Senior staff from Head Office to cover the Tropical Cyclone Watch. The Tropical Cyclone Watch period in PNG commences on 1st November to 31st May each year. The general public would normally advise of this commencement throughout the month of October via the various media in the country.

#### a. Warning Distributions

Warnings are distributed through the following:-

- (a) Radio Broadcasts - NBC Kalang and Karai
- (b) Television
- (c) AFTN (Aeronautical Telecommunication Network)
- (d) Telephone
- (e) Telex
- (f) Fax
- (g) GTS (Global Telecommunication Network)

#### b. Liaison with other Tropical Cyclone Warning Centres in the Region

PNG with liaison and consultations with the neighbouring Tropical Warning Centres and the countries in the Region to date have been very good. Exchange of data warnings including tsunami from Hawaii are timely.

#### c. Difficulties

There are various problems that we have encountered in the past. Some we have been able to minimise, others are still with us in various forms. Some of these are:-

- (a) Poor communication to various Provinces particularly in the most isolated islands.
- (b) People do not listen to warnings.
- (c) Not enough Educational Programme by Authorities of the dangers.
- (d) Inadequate data coverage within the area where the system is being located to substantiate the type and degree of warning.

- (e) Specialise training is require in the area of Tropical Cyclone Watch and Warnings and other associate activities.
- (f) Communication upgrade between Port Moresby and Melbourne needs a major upgrading to enable the Centre to excess most update available data from the Region.  
Some preliminary costing have been done to assess the entire upgrading but, full details has to be confirmed with the Regional most applicable system.
- (g) Need for open and close working environment between the related Authorities to focus on needs within the Tropical Cyclone Prone Areas, so that limited resources can be better utilised.

*Engineering Section*

The above operation is supplemented by a small Engineering section with a staff of five. Their task is to maintain our technical equipment which includes:-

- (a) Radar 2 WF33
- (b) Radiosonde/DIGICORA 3
- (c) Satellite Receivers 2
- (d) Electrolysers systems 3 one yet to be installed
- (e) Automatic weather station (AWS) 1
- (f) Radio Network (SSB) 7
- (g) Calibration Equipment
- (h) Other Conventional / Non Conventional Equipment
- (i) Communication Equipment

*NWS Network*

PNG NWS Network comprises of the following activities.

*a. Official Stations*

There are twelve official stations which are manned and staffed by PNG NWS. These are:-

- |                 |  |
|-----------------|--|
| 1. Port Moresby | 8. Misima                                  |
| 2. Nadzab       | 9. Daru                                    |
| 3. Madang       | 10. Kiunga                                 |
| 4. Wewak        | 11. Gurney                                 |
| 5. Rabaul       | 12. Kieta (closed)                         |
| 6. Kavieng      | 13. Hoskins (to be opened in late October) |
| 7. Momote       |  |

In addition to above twelve official station we have Mount Hagen and Goroka which are currently only providing aeronautical reporting by Air Traffic Controllers.

*b. Synoptic Allowance Stations*

PNG Network of twelve official stations is supplemented by thirty six (36) synoptic allowance stations who are doing three hourly reporting direct to the Forecasting Office or via other forms of communications such as telephones, radio (SSB), facsimile, AFTN Telex etc. Payments for above services to individuals who are providing this service are paid on a monthly basis of approximately between K415.00 to K480.00 by PNG NWS.

*c. Climate Stations*

On the network there are ten (10) climate stations, operated mainly by the Department of Agriculture Forestry and other private and semi government organisations. See attached list.

*d. Rainfall Network*

The original rainfall network of PNG consist of nine hundred and sixty three (963) stations. Quite a number of stations have been closed and we are now left with 131 stations. In the past it was a voluntary activity, but in more recent years individuals have demanded payments of some form to continue providing this service.

*e. Upper Air Stations*

- (a) Radiosonde Sounding - 3  
*Port Moresby* Philips remodified by the Bureau of Meteorology  
*Madang* - DIGICORA - WMO VCP under TOGA COARE Project.  
*Momote* - ISS donated to PNG NWS by USA Government after the TOGA COARE Project.
- (b) Balloon flights observations - 7 stations (one closed).

They are:

- |                 |        |
|-----------------|--------|
| Port Moresby    | Nadzab |
| Madang          | Misima |
| Kavieng         | Momote |
| Rabaul (closed) |        |

### f. Radar Stations

There are 3 radar stations, though one was decommissioned in November 1993:

- Port Moresby - WF44 decommissioned.  
Negotiations underway for replacement - yet to be funded. WF100 is being considered.
- Nadzab - WF33. Wind find only WMO/UK VCP
- Port Moresby - WF33 Wind find only. WMO/UK VCP

### g. Automatic Weather Stations

There is currently one at Jacksons Airport, Port Moresby, funded by PNG NWS. It was installed with assistance from Bureau of Meteorology (Australia) and began operations in October 1993.

Negotiation with AusAID is almost completed to fund additional three (3) AWS for Milne Bay Province under the Provincial Grant Scheme.

### h. Electrolyser Systems

Three electrolyser systems have been purchased by NWS in the last three years, two have been installed with assistance from the Bureau of Meteorology Australia. The latest will be installed towards the end of 1994.

### i. Satellite Receivers

There are currently two:

- Port Moresby - purchased by NWS
- Rabaul - donated by Japanese Government after the TOGA COARE Project

### CLICOM

The system was made available through WMO VCP Programme delivered to PNG end of 1992. Due to no office accommodation the system was not installed till end of October 1993, under the WMO VCP Programme, installation and basic training on the operation of CLICOM was done by an expert from Malaysia Mr Lee Tan, 18-29th October 1993.

System includes the following:-

- (a) 386 Machine Hard-Disk Drive was found not working. Local computer firm to replace the HD of 200 MB.
- (b) The 486 computer was down during the installation of CLICOM, so it is still not repaired. Advised the WMO, what to do about it, because it is still on warranty.

### Steps taken to rectify the system

1. Internal financial arrangements has been done to replace the CLICOM System with file saver and 4 x 486 PC with 66 MB/100 MHZ. 8MB RAM
2. Confirmation has been received from the WMO (Director of WCP, Dr V. Boldirev) as of 19th September 1994 that WMO will pay for Mr Lee's per diem whilst PNG NWS to meet airfares.
3. AusAID has also approved Mr Vele Kula's further 3 months training in Australia on CLICOM. The first three months was taken in UK under WMO/UK VCP, and two weeks in Manila - Philippine.
4. Training requirements on CLICOM  
NWS will require indepth training in data processing management, programming, and archiving. Technical training on maintenance of equipment is also a priority and considered when funding is available.

### Training 1993/94

PNG NWS is grateful to the WMO for assistance extended under it's VCP Programme. During the years and to date. We acknowledge also the extended assistance by member countries and other organisations under this programme, and in particular Australia, New Zealand, United Kingdom, USA, China, Korea, Denmark, Canada, SPREP, UNDP.

Training courses undertaken in 1993 / 94 included:

1. Aeronautical forecasting attachment Nairobi Kenya. (One WMO).
2. International course weather forecasting nanjing China. (One - WMO/China).
3. Training workshop on Tropical Cyclone Santa Cruz Mexico (One - WMO/ICSU).
4. Instrument calibration training course Korea (One - WMO/Korea).
5. Training course on CLICOM Australia Manila. (Two - AIDAB Australia/WMO)
6. Climatological forecasting Manila. (One - WMO)
7. Training course on Aeronautical Meteorological Radar Application Florida USA (One - USA/UNDP)
8. Technical training on WF33. (Three - UK/WMO).
9. Meteorological Instructors course Seoul Korea (One - WMO/Korea)

10. Pacific Island Level Three Wellington NZ. (Seven - WMO/NZ)
11. Technical training on Vaisala Met equipment Australia (One - Australia)
12. Science Masters Programme Australia (One - Australia)
13. Meteorologist Course Melbourne. (One - AusAID Australia)

#### *PNG NWS Training Needs*

NWS Training needs are as follows:

- (a) Post Graduate Meteorologist Course, three candidates are on the list for training Bureau of Meteorology Australia has reserve 2 places but funds is yet to be secured. Roughly \$15,000.00 US dollars per student.
- (b) Specialise training in Tropical Cyclone Tracking and Monitoring.
- (c) Data Processing and Management
- (d) Technical Training on Meteorological equipment which includes:  
Radar, satellite, radiosonde, communication met equipment and others.
- (e) Senior Managerial Technical and Operational Training
- (f) Agrometeorological training
- (g) Hydrological training.

#### *Planned Projects 1993/1994*

PNG NWS in collaboration with the WMO the Regional organisations and other government and semi-government authorities are collectively working on a couple of projects. Some are underway others are still yet to take off the ground.

These are:-

1. *Review and modernisation of PNG NWS operational equipment.*

NWS has requested Bureau of Meteorology Australia to assist in coordinating this exercise. The project is funded initially by PNG NWS for stage one and two and will require outside funding for the final stage. The project covered the following areas.

Final stage the project covered the following areas:

- (a) Review NWS Surface Synoptic Network
- (b) Upper Air Observation Network

- (c) Automatic Weather Stations
- (d) Weather Surveillance Radar Network
- (e) Communication Network
- (f) Staffing

This project started in 1992 and since then we have been able to accomplish the following:

- (a) Three Meteorological observers course have been conducted internally funded. 1992, 1993, 1994, and 1995 is planned.
- (b) Purchased of three electrolyzers systems, two have been installed. Internal funding.
- (c) Purchased and installation of one AWS Automatic Weather Station. Three additional to be purchased by AIDAB Australia.
- (d) Replacement of WF44 dual mode radar for Jacksons Airport. WF100 is being recommended for the alternate replacement.
- (e) Training of three officers on WF33 Radar UK under WMO/UK VCP.
- (f) Opening of three new official stations into the network.
- (g) Two additional upper air radiosonde stations.
- (h) One additional satellite receiving station

#### *2. Agrometeorological Project - Strengthening of Meteorological Services to Agriculture and Forestry*

This project was submitted to WMO in 1991/1992. WMO expert made an assessment and a proposed document was submitted to PNG Government in mid 1993. The project to have commenced in 1994. The PNG Government has just resubmit to the WMO through UNDP Port Moresby in September this year.

The project will involve three experts on a three year period. PNG Government Component on this project would be US\$696,500.00. This amount will include office space and local staff. To this stage has completed almost its requirement with new office building, and recruitment of additional staff. UNDP/WMO to advise on the latest.

#### *3. Sea Level Rise Monitoring*

The Department of Environment and Conservation, is PNG Focal Point for this project. PNG NWS is in this committee, and we are to continue to liaise with the focal point on the progress of installation. NWS attended the SPREP Meeting on Sea Level Rise in Solomon Islands May 1994.

Progress on installation. Two officers arrive in PNG early September 1994 on their way to Manus Island Lombrum Defence base to see the proposed site.

4. *ARM - Atmospheric Radiation Measurement Programme*

This programme is being initiated by the US Government to set up several stations in this Region. PNG Manus Island is being selected to be the first station in this Region.

NWS has been approached to monitor the equipment on behalf of the ARM's office. Negotiation is now under for site preparations and other logistical issues that needs to be finalised before the project takes off. SPREP office in Apia is aware of this arrangement.

*Disaster*

PNG has had its share of the natural disaster that being experienced globally. In the last two years PNG has experienced more effects from natural disasters than ever before.

In 1992 two land slides in which two entire villages were buried. Tropical Cyclone Adel which devastated Trobriand Island and (7) people were dead, food gardens, buildings property were lost.

In 1994 we experienced so three land slides one whole village is believed to be buried, and more than forty thousand people are affected. Tropical Cyclone Rewa devastated the Southerneastern Islands of Milne Bay. Ten people were killed and substantial amount of property was lost.

## Tuvalu

### *Background information*

The Tuvalu Meteorological programme began in 1951 under the auspices of the South Pacific Air Transport (SPATL). The council established observing stations in Tuvalu and other Pacific nations in order to supplement the meteorological reporting network in the region. An upper air station was subsequently established on Funafuti in 1960 following dissolution of SPATL in 1979, the New Zealand Meteorological Service assumed full support of the programme under an MOU with the Tuvalu Government.

Direct management support continued until early 1989 when the Officer-in-Charge post was localised. At this stage, some funding for the programme was transferred to the Ministry of External Relations and Trade of the New Zealand Government (now Ministry of Foreign Affairs and Trade), but the majority of funding (approx 80%) continues to be supplied and/or managed by the Meteorological Service of NZ Limited.

The purpose behind the Meteorological station continues essentially as it did in the early days, with information from this data sparse area being necessary for accurate production of weather forecasts for Tuvalu and its neighbours, and in assisting with the early detection of tropical cyclone development. Tuvalu lies across a known development region for tropical cyclone activity, and therefore provides a significant contribution to forecasting. Despite modern technology the value of such a reporting programme cannot be understated.

### *Components of the Meteorological Programme in Tuvalu.*

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

#### *1. The Surface programme*

This programme is made up of hourly, 3 hourly, 6 hourly and/or daily observation of various weather elements. There are 5 rainfall stations which Funafuti station receives their data at the end of each month. Four synoptic stations including Funafuti.

#### *2. The Upper Air programme*

The upper air weather observation programme is further split into radar and radiosonde observations. Although flown together from the same weather balloon, the information obtained for each observation is quite different.

- Radar observation provides essential wind speed and direction data to provide input not only into the regular global computer models at London, Washington, Tokyo and other forecasting centres, but also for local aviation forecasts and general weather information at Nadi, Wellington and Melbourne. This enables more accurate forecasts to be prepared for Tuvalu and the region.
- Radiosonde observations provide information in addition to the radar-temperature, relative humidity and air pressure data are received at the ground station in Funafuti, and calculated to give a profile of the 'condition' or status of the atmosphere, relative to both surrounding region and the normal or standard atmosphere. Such comparisons form the basis of analysis and weather forecasting techniques in global computer and manual models. In regard to tropical cyclone development or likely development, these additional parameters are vital.

Both programmes may contribute to significant atmospheric research programmes from time to time.

### *Other Programmes*

The Meteorological Division also contribute to and assists with other scientific programmes on Funafuti.

#### *1. South Pacific Sea Level and Climate Monitoring Project*

The Flinders University of South Australia National Tidal Facility has installed a tide gauge at the main Funafuti Wharf. This project is funded by AusAID, maintained and administered by the University.

#### *2. University of Hawaii Tide Gauge*

The University of Hawaii has operated a tide gauge at the old wharf for many years. This project is funded through the University, but some maintenance, and daily monitoring is provided by Meteorological Division Staff.

#### *3. Automatic Weather Station*

The USA National Weather Service recently installed an automatic weather station adjacent to the Meteorological Division facilities. All equipment was provided by the US installation of the mast was undertaken by the Met Division Staff.



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*Funding sources for the Tuvalu  
Meteorological Programme*

Funding is provided from 3 separate sources:

1. New Zealand Government Bilateral Aid
2. Meteorological Service of NZ Ltd
3. World Weather Watch, through the Met Service NZ. For 1995 the Government of Tuvalu is contributing a small portion to the operational of the Met Service.

*WMO Membership*

Due to the changes in Government last year, the endorsement of the application which approved by the former Government was again reviewed. The present Government is reluctant is yet to approve because of financial implication and a question of feasible/beneficial to the country. The Ministry of Labour Works and Communications supports the application, and is recommending and convincing the present Government for Tuvalu to be member of WMO. The Government awares of the WMO congress next year May-June.

*CLICOM*

The CLICOM package has been installed in June 1994. CLICOM training was made possible by the Bureau of Meteorology in which Tuvalu participated. Tuvalu Met Service would request for assistance in setting up CLICOM and request NZ Met to provide data/historical data of Tuvalu Met Stations synoptic/rainfall since the beginning of observations.

