

# **REGIONAL ASSOCIATION V (SOUTH-WEST PACIFIC)**

**FOURTEENTH SESSION OF THE RA V MANAGEMENT GROUP**

**GENEVA, 17 June 2016**

**FINAL REPORT**



**WORLD METEOROLOGICAL ORGANIZATION**

**FOURTEENTH SESSION OF THE RA V MANAGEMENT GROUP  
(Geneva, Switzerland, 17 June 2016)**

**1. ORGANIZATION OF THE SESSION**

1.1 The fourteenth session of the RA V Management Group (MG-14) was held at the WMO Headquarters on Friday, 17 June 2016, during the sixty-eight session of the Executive Council. Dr Andi Eka Sakya, President of RA V, opened the session at 08:30. The Group adopted the provisional agenda as given in Annex I.

**2. MATTERS ARISING FROM THE THIRTEENTH SESSION**

2.1 The Group recalled that the thirteenth session of the RA V Management Group (MG-13: Geneva, 29 May 2015) focused on the follow-ups on the sixteenth session of Regional Association V including the nomination of membership and the development of the RA V Operating Plan 2016-2019.

2.2 The Group noted that the 99 nominations were received from Members including the leads/vice-leads of the Working Groups and experts for the Task Team. The Group received proposed membership of RA V subsidiary bodies and agreed that the membership would be effective until the new membership is decided by the session or the president of the Association.

2.3 The Group requested the chairperson of RA V TT-OP 2016-2019 to complete the RA V Operating Plan 2016-2019 in reference to the WMO Strategic Plan 2016-2019 in cooperation with the WMO technical departments, and submit the RA V Operating Plan 2016-2019 to the president of RA V for approval in consultation with MG members by the beginning of the next financial period.

**3. PROGRESS REPORT OF THE WORKING GROUPS AND TROPICAL CYCLONE COMMITTEE**

3.1 The Group was informed of the activities of the RA V subsidiary bodies including: Tropical Cyclone Committee (TCC), Working Group on Hydrological Services (WG-HYS), Working Group on Weather Services (WG-WXS), Working Group on Climate Services (WG-CLS) and Working Group on Infrastructure (WG-INFR). The progress reports of respective Working Groups are attached as Annex II.

3.2 On behalf of the leads of WGs and the chairperson of TCC, the Secretariat presented the highlights of the achievements: TCC conducted important progresses including the operational Severe Weather Forecast Demonstration Project (SWFDP) with the Regional Specialized Meteorological Centre (RSMC) in Wellington and Southern Hemisphere Tropical Cyclone Workshop held in Melbourne 5-9 October 2015; WG-HYS conducted important progresses including modification of title and scope of the Task Team on Hydrology Database Management to promote the adoption of a Quality Management Framework - Hydrology in the Region, and establishment of an on-line forum (web portal); WG-WXS formulated the Terms of References and drafted a set of recommendations on aviation services in Southeast Asia and the Southwest Pacific; the meeting of the Working Group on Climate Services (WG-CLS) was held in Singapore from 2 to 4 February 2016; WG-INFR

achieved important progresses including contribution of TT-WIGOS to the development of WMO Regulatory Material concerning surface based observations (Automatic Weather Stations) and the WIGOS Metadata Standard.

#### **4. OUTCOMES OF THE REGIONAL FORUM FOR DIRECTORS OF NMHSs IN RA V**

4.1 The Group was informed of the key outcomes of the Regional Forum for Directors of NMHSs in RA V that took place in Fiji on 28-30 October 2015 as given in Annex III.

4.2 The Group was informed that the aim of the Regional Forum for Directors of NMHSs in RA V (RA V RF-2015) was to review emerging issues and challenges since the sixteenth session of Regional Association V (RA V-16) held in Jakarta, Indonesia (May 2014), identify means for improvement of management and operations of NMHSs for further discussion at the next session in RA V, and to facilitate the sharing of experiences among Directors of NMHSs in RA V through discussions on a range of potential topics and provide opportunities for Directors of NMHSs in RA V to contribute to the implementation by WMO of the global frameworks/programmes in RA V.

4.3 The Group requested the leads of WGs and the chairperson of TCC to follow up, in cooperation with the technical departments of the Secretariat, the implementation of the recommendations of the Regional Forum for Directors of NMHSs in RA V.

#### **5. TERMS OF REFERENCE FOR RA V WORKING GROUPS AND TROPICAL CYCLONE COMMITTEE**

5.1 The Group noted that as a follow up on the recommendations of RA V-16 and RA V MG-11, the Terms of Reference for individual RA V WGs and TCC have been updated by the leads/vice-leads of WGs and the chairperson of TCC in cooperation with the focal points of the relevant technical departments in WMO.

5.2 The Group noted that the ToRs of Task Teams (TTs) of TCC, Task Team on Severe Weather Forecasting including Global Data Processing and Forecasting System (TT-SWFD/DPFS) and Task Team on Coastal Inundation including Storm Surges (TT-CISS), are not completed yet, and will be discussed during the sixteenth session of TCC, which is scheduled to be held in Honiara, Solomon Islands, 29 August - 2 September 2016.

5.3 The Group commended the work of the leads of WGs and the chairperson of TCC for their contribution to the updated Terms of Reference and endorsed the new Terms of Reference except for TTs of TCC as given in Annex IV, and requested the chairperson of TCC to complete the ToRs for TTs of TCC and submit to the president of RA V for approval.

#### **6. RA V OPERATING PLAN 2016–2019**

6.1 The Group noted that Cg-17 decided to establish regional operating plans and other implementation plans, as necessary, addressing agreed strategic priorities from a regional perspective and ensuring the engagement of Members in focused activities aimed at achieving the Expected Results of the WMO Strategic Plan.

6.2 The Group recalled that MG-13 reiterated that the RA V OP 2016–2019 should be based on the challenges and future priorities in the region, which were identified by the

questionnaire survey and discussion at the RECO-6. The Group also requested the RA V OP 2016–2019 retain only the specific deliverables to be implemented especially for the monitoring and evaluation purposes.

6.3 The Group noted that a draft RA V OP 2016–2019 containing deliverables and activities has been developed by ad-hoc Task Team on RA V Operating Plan 2016-2019 (RA V TT-OP 2016-2019) in consultation with technical departments of the WMO Secretariat as given in Annex V.

6.4 The Group reviewed the draft RA V OP 2016–2019 in light of the appropriateness of the number of deliverables and activities, priority areas of RA V identified at the regional survey and RECO-6, and the concreteness and feasibility of the proposed activities.

6.5 The Group commended the substantial work carried out by the RA V TT-OP 2016-2019, especially Mr Jon Gill, Bureau of Meteorology Australia, chairperson of the Task Team for the development of the draft RA V OP 2016–2019 with the assistance of relevant technical departments of the WMO Secretariat.

6.6 The Group was pleased to endorse the RA V OP 2016–2019 and requested the Secretariat to submit the endorsed RA V OP 2016–2019 for inclusion in the WMO-wide Operating Plan 2016-2019.

6.7 The Group requested the leads of Working Groups and TCC chairperson to develop a work plan for 2016–2017 based on the endorsed RA V OP 2016-2019.

## **7. REGIONAL ACTIVITIES IN 2016-2019**

7.1 The Group reviewed the budgeted regional activities in 2016-2019 proposed by the Secretariat, as given in Annex VI.

7.2 The Group was informed that as a follow up on the Regional Forum for Directors of National Meteorological and Hydrological Services in RA V (28-30 October 2015, Fiji), the RA V WG-CLS (2-4 February 2016, Singapore) encouraged the member countries in Southeast Asia to provide contributions to the proposed RA V Southeast Asian Regional Climate Centre Network (RCC-Network). The Group was informed with pleasure that Australia, Indonesia, Malaysia, the Philippines, and Singapore expressed their intention contribution for the RA V Southeast Asian RCC-Network.

7.3 The Group expressed their appreciation to the Government of Solomon Islands for hosting of the RA V Tropical Cyclone Committee (TCC-16) from 29 August to 2 September 2016 in conjunction with Severe Weather Forecasting Demonstration Project (SWFDP) Management Team meeting on 24-26 August 2016.

7.4 The Group encouraged the leads of Working Groups and TCC chairperson to organize a video conference more frequently in addition to at least one face-to-face meeting of the subsidiary bodies to facilitate the implementation of the mandates based on the approved RA V OP 2016–2019 and to enhance the communication among the members. The Group also agreed to meet more frequently via videoconferencing when necessary.

## **8. PROGRAMME FOR WMO SMALL ISLAND DEVELOPING STATES (SIDS) AND MEMBER ISLAND TERRITORIES (MITs)**

8.1 The Group was reminded of the establishment of the new Programme for WMO SIDS and Member Island Territories (MITs) that was approved at Cg-17. It was recognized as a significant achievement that will help to focus the work of Members and partners on the meteorological and relevant capacity development needs of small island NMHSs.

8.2 The Group reviewed the EC-68 Agenda Item 10.3 regarding Implementation of the Small Island Developing States (SIDS) and Member Island Territories (MITs) Programme as given in Annex VII, and supported the priorities identified by the Ad Hoc Advisory Group and the proposal to invite inter-regional representation of Permanent Representatives from WMO SIDS and MITs to an Advisory Group for the SIDS-MITs programme.

8.3 The Group was informed by the Secretariat that there is no core budget allocation to the Programme, while the implementation of the Programme will be funded through technical assistance, voluntary contributions and in-kind contributions.

## **9. OTHER BUSINESS**

9.1 The Group was briefed by Dr Lars Peter Riishojgaard (WIGOS Project Manager) and Ms Sue Barrell, PR of Australia, about the requirements for the establishment of the Regional Centre for WIGOS.

## **10. CLOSURE OF THE SESSION**

10.1 The President adjourned the fourteenth session of the RA V Management Group at 9:30 for EC-68 and resumed at 17:30. The President closed the session at 18:30 on Friday, 17 June 2016. Before closing, the President thanked all the participants for their fruitful discussion and expressed his satisfaction with the outcomes made in the session. He also thanked the WMO Secretariat for the arrangements of the session. The list of participants is attached as Annex VIII to this report.

**FOURTEENTH SESSION OF THE RA V MANAGEMENT GROUP  
(Geneva, Switzerland, 17 June 2016)**

**AGENDA**

1. Organization of the Session
2. Matters arising from the Thirteenth Session
3. Progress report of the Working Groups and Tropical Cyclone Committee
4. Outcomes of the Regional Forum for Directors of NMHSs in RA V
5. Terms of Reference for RA V Working Groups and Tropical Cyclone Committee
6. RA V Operating Plan 2016–2019
7. Regional Activities in 2016-2019
8. Programme for WMO Small Island Developing States (SIDS) and Member Island Territories (MITs)
9. Other Business
10. Closure of the Session

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**PROGRESS REPORT OF THE WORKING GROUPS AND TROPICAL CYCLONE COMMITTEE**

**Tropical Cyclone Committee for the South Pacific and South-East Indian Oceans (TCC)**

Mike Bergin  
Bureau of Meteorology, Australia

**1. Introduction**

This report summarizes activities in association with the expert groups of Task Team on Severe Weather Forecast and Disaster Risk Reduction including Data Processing and Forecasting System (TT-SWFD/DPFS) during the period 2015-2016.

**2. Working Group Structure**

The Working Group is composed of one chair, Task Team on Severe Weather Forecast and Disaster Risk Reduction including Data Processing and Forecasting System (TT-SWFD/DPFS); and Task Team on Coastal Inundation including Storm Surge (TT-CISS). Each TT consists of one leader and several experts.

**3. Terms of Reference**

The terms of reference of the Tropical Cyclone Committee for the South Pacific and South-East Indian Oceans (TCC) are as follows:

- (a) To promote and coordinate the planning and implementation of measures for the improvement of cyclone warning systems and related meteorological services and the facilitation of efforts to minimize loss of life, human suffering and damage caused by tropical cyclones and related natural hazardous phenomena in the tropical part of Region V south of the equator;
- (b) To review regularly the status of tropical cyclone warning systems in the RA V Tropical Cyclone Committee area and recommend measures for the development or improvement of these systems;
- (c) To review regularly the Tropical Cyclone Operational Plan for the South-Pacific and South-East Indian Ocean and recommend any amendments to the text of the Plan to the president of RA V for approval;
- (d) To coordinate its work with other activities carried out within the WMO Tropical Cyclone Programme, in particular, with the Regional Association I Tropical Cyclone Committee for the South-West Indian Ocean and the Economic and Social Commission for Asia and the Pacific(ESCAP)/WMO Typhoon Committee;
- (e) To coordinate its activities with other RA V Working Groups;

- (f) To develop, update and facilitate the implementation of the Technical Plan of the RA V Tropical Cyclone Committee;
- (g) To seek, through RA V, financial and technical support for the programme activities;
- (h) To promote and coordinate the planning and implementation of measures for the establishment of the Storm Surge Watch Scheme in the Region in collaboration with the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM); and
- (i) To establish task teams as it finds necessary to carry out the work of the Committee, noting the decisions of RA V with respect to the creation of the Task Team on Severe Weather Forecasting including Global Data-processing and Forecasting System and the Task Team on Coastal Inundation including Storm Surges.

#### 4. Membership

TCC		Name	Country
Chair		Mr Mike BERGIN	Australia
Task Team on Severe Weather Forecast and Disaster Risk Reduction including Data Processing and Forecasting System (TT-SWFD/DPFS)	TT Leader	Mr James LUNNY	New Zealand
	Expert	Mr Moleni TU'UHOLOAKI	Tonga
		Mr Tom EVANS	USA
		Mr A. Fachri RADJAB	Indonesia
		Misaeli Funaki	Fiji
Task Team on Coastal Inundation including Storm Surge (TT-CISS)	TT Leader	Dr Jamie RHOME	USA
	Expert	Mr Reginald HINGANO	Tonga
		Mr Agus Wahyu RAHARJO	Indonesia
		Terry Atalifo	Fiji

#### 5. Task Team on Severe Weather Forecast and Disaster Risk Reduction including Data Processing and Forecasting System (TT-SWFD/DPFS)

Rather than a separate TT the RSMT for the project continues to be the focal point for arrangements for provision of outcomes. As the lead RSMC for this project, Wellington continued to provide a platform (MetConnect Pacific at <http://swfddp.metservice.com>) for the SWFDDP products. This website also provides helpful background material and links to global centres, other RSMCs and the NMHSs. Twice daily the RSMC staff produces the RSMC Daily Severe Weather Forecasting Guidance Products, referred to as the "South Pacific Guidance (SPG)" charts.

Users of the SWFDDP website, MetConnect Pacific, view the SPG charts on the landing page. The SPG charts continues to be published uninterrupted on MetConnect Pacific (MCP) twice a day around 0300 UTC and 1500 UTC.

Under the RSMC tab on MetConnect Pacific, the RSMC Darwin images for TC Data over the central and southwest South Pacific domains are updated twice a day without any hitches. ACCESS-TC images are loaded onto the RSMC Darwin webpage whenever there is a



live tropical cyclone without having to login to the RSMC Darwin where there are more specialized charts.

Work on the Multi-centre Ensemble images on the UK Met office page was completed and was made available on the SWFDDP MetConnect Pacific Website, example of the product is given below. The Japanese Meteorological Agency made real-time 10 minute Himawari-8 images available for use for the Pacific Islands, the link as well as interpretation material was made available to SWFDDP.

### Training Activities

- Rick Jones (WMO consultant) provided SWFDDP training in Samoa 8-13 March 2015

RSMC Wellington assisted with SWFDDP training on the following Pacific islands.

- Lisa Murray – Fiji and Kiribati from 20 April to 30 April 2015
- Vive Bukto – Tonga and Tuvalu from 31 August – 11 September 2015

participants on the SWFDDP MetConnect Pacific website.

### Evaluation Summary:

The following is a table summarizing the evaluation in section 5. It also colour coded with red indicating non-compliance. Unlike the previous evaluation period, the biggest issue is the lack of reports. It may have been a “quiet period” but it doesn’t obviate submitting an Annex I. Another issue is the lack of evidence – surely there were newspaper clippings for some of the events. None were included in their reports. Unlike some of the other NMHS’s, the Solomon’s experienced a number of events. The SIMS provided a complete set of Annex H’s and verification tables but did not submit an Annex I. In their Annex H’s SIMS provided some evidence. Fiji, Niue, Tonga, and Kiribati provided Annex I’s but did not provide any evidence. This requirement was clearly indicated in the RSIP and in Annex I.

Required Criteria in order to progress to Phase 4	Solomons	Vanuatu	Kiribati	Tuvalu	Fiji	Samoa	Tonga	Niue	Cooks
Non TC Warnings sent to Wellington	NC	NC	FC	NC	FC	NC	FC	FC	NC
Non TC warnings functioning smoothly - DMCPA	FC	NC	FC	NC	NC	NC	NC	NC	NC
Verification spreadsheet	FC	NC	PC	NC	NC	NC	FC	FC	NC
Case study	NC	NC	NC	NC	NC	NC	NC	NC	NC
Progress report on time	FC	NC	FC	NC	NC	NC	NC	FC	NC
Feedback from DMCPA	FC	NC	NC	NC	NC	NC	NC	NC	NC
Feedback from Media	NC	NC	NC	NC	NC	NC	NC	NC	NC
Feedback from Public	NC	NC	NC	NC	NC	NC	NC	NC	NC

FC – Fully compliant  
 PC- partially compliant  
 NC- non compliant

The table demonstrates the significant challenge facing the project in obtaining sustained feedback from participating countries. It is hoped that the 12<sup>th</sup> progress report currently under development will show higher levels of engagement.

## **6. Task Team on Coastal Inundation including Storm Surge (TT-CISS)**

This TT has yet to meet formally and its composition and TORs will be reviewed at the upcoming TCC meeting in Solomon Islands in late August 2016.

## **7. TCC Meeting**

The sixteenth session of TCC (RA V TCC-16) will take place in Honiara, Solomon Islands from 29 August to 2 September 2016. In previous 12 months the major training activity was the Southern Hemisphere Tropical Cyclone Workshop that was held in Melbourne 5-9 October 2015 with 16 participants from Fiji, Tonga, Samoa, Solomon Islands, Papua New Guinea, Indonesia, New Zealand, Australia, Cook Islands, Vanuatu, Tuvalu, Timor Leste, Federated States of Micronesia and Australia.

**Working Group on Hydrological Services (WG-HYS)**  
John Fenwick  
National Institute of Water and Atmospheric Research, New Zealand

**1. Introduction**

The previous Working Group completed little of its Work Plan due to key members retiring or having their employment direction changed. After some discussion and delay due to a small number of nominations for Task Teams, the Working Group was re-established during 2015. A meeting was held in late 2015 which were successful in setting a new Work Plan.

**2. Working Group Structure**

The Working Group is composed of one leader, two vice-leaders, Task Team on Training and Capacity Building in Hydrology (TT-TCB-H); Task Team of Hydrology Database Management (TT-HDM); Task Team on Disaster Risk Reduction – Water-related Disasters (TT-DRR-W); and Task Team on Water and Climate (TT-WC). Each TT consists of one leader and several experts.

**3. Terms of Reference**

The terms of reference of the Working Group on Hydrological Services (WG-HYS) are as follows:

- (a) To monitor, promote and develop strategies and activities that will enhance the capabilities of RA V Members to improve the quality of hydrological services and to deliver and improve access to these services, with an emphasis on improved observation and monitoring systems;
- (b) To coordinate with relevant WMO bodies, particularly the Commission for Hydrology (CHy), and other groups to enable improved forecasting capabilities, including the provision of more accurate, timely and reliable forecasts and warnings and enhanced delivery of related information and services;
- (c) To assist RA V Members to apply a quality management approach that will enable and support the sustainability of hydrological services;
- (d) To provide hydrological advice and guidance to RA V Members regarding the development of the new WMO programme for Small Island Developing States (SIDS) and Member Island Territories;
- (e) To establish and coordinate task teams, as required, complete specific activities related to the objectives, priority areas and planned deliverables of the Working Group;
- (f) To report and provide advice to the RA V Management Group on the above issues.

#### 4. Membership

WG-HYS		Name	Country
<b>Lead</b>		<b>Mr John FENWICK</b>	<b>New Zealand</b>
<b>Vice-Lead</b>		<b>Dr SUPRAPTO</b>	<b>Indonesia</b>
		<b>Mr Roy A. BADILLA</b>	<b>Philippines</b>
Members Task Team on Training and Capacity Building in Hydrology (TT-TCB-H)	TT Leader	Mr Petrus SYARIMAN	Indonesia
	Expert	Mr PAAT	Philippines
		Mr Taaniela KULA	Tonga
		Mr Lameko ASORA	Samoa
Task Team of Hydrology Database Management (TT-HDM)	TT Leader	Ms Margaret BAUTISTA	Philippines
	Expert	Mr Roddy HENDERSON	New Zealand
		Dr Eka NUGRAHA ABDI	Indonesia
		Mr Taaniela KULA	Tonga
		Mr Andre Siohane	Niue
Task Team on Disaster Risk Reduction – Water-related Disasters (TT-DRR-W)	TT Leader	Mr Jeff PERKINS	Australia
	Expert	Dr Christian ZAMMIT	New Zealand
		Dr William Marcus PUTUHENA	Indonesia
		Mr Taaniela KULA	Tonga
		Mr 'Ofa FA'ANUNU	Tonga
Task Team on Water and Climate (TT-WC)	TT Leader	Dr Christian ZAMMIT	New Zealand
	Expert	Dr Fransisca MULYANTARI	Indonesia
		Dr Erwin E. S. MAKMUR	Indonesia
		Mr Taaniela KULA	Tonga
		Mr Mafutaga LEIOFI	Samoa
		Mrs Roslznn Mitiepo	Niue

#### 5. Activities of the Working Group

A meeting was held in Brisbane during 9-13 November 2015. It was attended by 10 members of the group, as well as by Dr. Harry Lins, the President of the Commission for

Hydrology, Mr Claudio Caponi from the Secretariat, Mr Peter Sinclair from SPC and in part, by several staff members of the host agency, the Australian Bureau of Meteorology.

Noting the main decisions of interest to RA V from CHy-14, Cg-17, EC-67, and RAV-16, the Group developed the terms of reference for its four Task Teams. It also took into account the priorities identified by the Regional Forum of Directors of NMHSs in RA in the area of hydrology were related to disaster risk reduction, development of QMSs and capacity building.

Noting also that the activities related to promoting a quality management approach in hydrology were of a cross-cutting nature and did not fit exactly under any of the Task Team titles, the Group agreed to modify the title and scope of the Task Team on Hydrology Database Management to give it the added responsibility of promoting the adoption of a Quality Management Framework - Hydrology in the Region.

The Group discussed and compiled the work plan 2016-2018 of the four Task Teams. The main points of the work plan, as established at the meeting, are:

- Implementation of FFGS and/or other appropriate tools such as coupling Himawari-8 in Region V.
- Provision of reports and web portal information on regional applications; IFAS, TopNet, IFFRM, Delft-FEWS etc.
- Propose strengthened, or establishment of, early warning systems for floods in Members of RA V.
- Promote development of hydrological products for inputs to end-to-end multi-disaster warning systems - Pac-HYCOS2, CIFDP.
- Promote regular discussions between NMSs and NHSs through a community of practice web portal.
- Strengthen or develop national joint programmes between NMSs, NHSs and NDMOs on public awareness and education on floods that is inclusive of women, girls, youth, children, disabled people, and vulnerable communities.
- Develop and help implement water sector products (climate outlooks, EHP material, workshops, etc.,) as part of GFCS and IDMP.
- Review and report on appropriate database systems for small countries/agencies.
- Assist in development of seasonal prediction products for water management purposes.
- Develop concept notes for Pac-HYCOS2, SEA-HYCOS and promote. Communicate via web portal and IWRM platforms.
- Support staff from Pacific Island Countries NHSs to post-graduate degrees in hydrology and courses based on QMF and WMO no. 1003.

The Group recommended that a follow-up meeting be held before the end of the intersessional period, in late 2017 or early 2018. Tonga expressed interest in hosting such a meeting. The Chair was tasked to address all RA V Members to promote the nomination of experts in the different Open Panels of CHy Experts (OPACHEs). The Group thanked the Queensland Regional Office of the BoM for their warm hospitality throughout the meeting.

## **6. Progress on Work Plan tasks**

- An on-line forum (web portal) has been established with the assistance of the Secretariat. Preliminary information has been posted and it has been promoted to WG-HYS members by email. Further information for a "community of practice" and other information are in preparation by TT leaders.

- A concept note for a Pacific-HYCOS Phase 2 was drafted (in conjunction with SPC) and sent in April to the Secretariat for appraisal and discussion with a potential donor agency. Feedback is awaited.
- A concept proposal for providing appropriate hydrological database software to NHSs in small and developing countries has been submitted to the Secretariat for comment.
- A case study on ISO 9001 QMS from the region was compiled and provided to the C-Hy Task Team on QMS. [Fenwick, J., (2016). Case Study Development of a Quality Management System for the Hydrological Service of the National Water and Atmospheric Research Ltd. (**New Zealand**) (**ISO certified**)]
- Assistance was provided to the C-Hy Task Team on QMS with review of QMS Checklist and Questionnaire reports.
- Assistance was provided to the Coastal Inundation Forecasting Demonstration Project by recruiting a new OPACHE member to serve as an expert representative for WMO on two proposed projects in the region (Fiji and Indonesia). Dr Graeme Smart has attended one project meeting as an alternate to the co-chair of the Project Steering Group.
- The WMO/IGRAC workshop “Advancing Groundwater Monitoring in Small Island Developing States in the Pacific” is planned to be held in Suva in the last week of August 2016. The Working Group will assist with providing guidance for the nomination of suitable candidates.

## **Working Group on Weather Services (WG-WXS)**

Raymond Tanabe

National Oceanic and Atmospheric Administration, United States of America

### **1. Introduction**

The Sendai Framework for Disaster Risk Reduction (2015-2030) and the four priorities for action, including understanding disaster risk, strengthening disaster risk governance, investing in disaster risk, and enhancing preparedness will clearly require continuing development of an emerging skillset. This skillset includes impact (as opposed to criteria or threshold) based forecasting and decision support, a deep understanding of community vulnerability and resiliency, quick adoption of new technology, and integration of social science.

Significant changes in aviation are on the horizon and the subsequent challenges for NMHS's will be compliance with new WMO aviation qualification standards, cost recovery mechanisms for the provision of aviation services, and the need for long term strategic planning.

### **2. Working Group Structure**

The Working Group is composed of one leader, two vice-leaders, Task Team on Cost Recovery (TT-CR), Task Team on Quality Management (TT-QM), Task Team on Training, Competencies and Qualifications (TT-TRG), and Task Team on Weather Services Implementation (TT-IMP). Each TT consists of one leader and expert(s) except TT-CR which does not have expert.

### **3. Terms of Reference**

The terms of reference of the Working Group on Weather Services (WG-WXS) are as follows:

- (a) To monitor, promote and develop strategies to enhance the capabilities of RA V Members to deliver and improve access to weather services, with an focus on sustainable aviation weather services;
- (b) To coordinate with WMO, the International Civil Aviation Organization and other key organizations to assist with the implementation of an improved and sustainable weather and warning service;
- (c) To identify and evaluate international best practices on the delivery of weather and warning services and communicate these to RA V Members;
- (d) To establish and coordinate its Task Teams, as necessary, to complete specific tasks related to the objectives and priority areas of the Working Group; and
- (e) To report and provide advice to the RA V Management Group on the above issues;

#### 4. Membership

WG-WXS		Name	Country
<b>Lead</b>		<b>Mr Raymond TANABE</b>	<b>USA</b>
<b>Vice-Lead</b>		<b>Dr Landrico Ureta DALIDA Jr.</b>	<b>Philippines</b>
		<b>Mr Grahame READER</b>	<b>Australia</b>
Task Team on Cost Recovery (TT-CR)	TT Leader	Mr `Ofa FA'ANUNU	Tonga
Task Team on Quality Management(TT-QM)	TT Leader	Ms Helen TSEROS	Australia
	Expert	Mr Lim Ze HUI	Malaysia
Task Team on Training, Competencies and Qualifications (TT-TRG)	TT Leader	Ms Lih Mei LIM	Singapore
	Expert	Dr Cynthia P. CELEBRE	Philippines
		Amit Singh	Fiji
Task Team on Weather Services Implementation(TT-IMP)	TT Leader	Dr Mohd Hisham MOHD ANIP	Malaysia
	Expert	Mr M. PRABOWO	Indonesia

#### 5. Activities of the Working Group

WG-WXS vice leads met at the RA-V Regional Forum in October 2015 to formulate the Terms of Reference. Aviation forecasting continues to be a driver in WG-WXS activities due to anticipated and significant changes to global aviation, air traffic management, QMS, and WMO aviation qualification standards.

One of the outcomes of Item 3.3 (Aviation Services in Southeast Asia and the Southwest Pacific) was a set of draft recommendations which are still under review. Some of these recommendations are already accounted for in the current WG-WXS operating plan and others may need to be incorporated in the future.

- identify and document current baseline, and needs, of RAV regarding: training (WMO 2016 requirements), QMS (migration to ISO 9001:2015), cost recovery , and data formats (GML/XML),
- provide these identified needs to WMO secretariat (through chair WG WXS),
- establish long term plan and roadmap in collaboration with PIAWS , and
- identify and map the linkages between PMC, WMO RAV-WG-WXS, WMO-relevant technical commission and to ICAO to ensure effective coordination.
- consider realigning structure and TOR of RAV WG-WXS to better meet needs of SIDS and PMC PIAWS panel



It is noted there are many overlaps between aviation related goals of WG-WXS and the PMC PIAWS panel and we should strive to bring these goals into better alignment.

#### **6. Working Group Meeting**

A full WG-WXS meeting concerning the 2016-2019 period is targeted for late 2016 or early 2017. At this time a full review of previous and future TT activities will be conducted

## **Working Group on Climate Services (WG-CLS)**

Flaviana D. Hilario

Philippine Atmospheric Geophysical and Astronomical Services Administration, Philippine

### **1. Introduction**

This report summarizes activities of the Working Group during the period 2015 to 2016.

### **2. Working Group Structure**

The Working Group is composed of one leader, two vice-leaders, Task Team on Climate Information and Prediction Services including Regional Climate Centres (RCCs) and Regional Climate Outlook Forum (RCOF) (TT-CLIPS), Task Team on Climate Data Management/Data Rescue (TT-CDM), Task Team on Climate Change (TT-CC), Task Team on Use of Improved Tools for Operational Agro-meteorology including Coping with Impacts of Natural Disasters on Agriculture (TT-ITA), and Task Team on Agro-meteorological Information (TT-AIF). Each TT consists of one leader and expert(s).

### **3. Terms of Reference**

The terms of reference of the Working Group on Climate Services (WG-CLS) are as follows:

- (a) To coordinate observational aspects of climate services including thorough liaison with the Global Framework for Climate Services (GFCS), the Global Climate Observing System (GCOS) and the Global Ocean Observing System (GOOS);
- (b) To provide advice on methods to strengthen and improve climate system monitoring, analyses and indices;
- (c) To keep abreast of the activities of the World Climate Services Programme (WCSP), Commission for Climatology (CCI), the World Climate Research Programme (WCRP) and its core research projects, the GFCS, the Intergovernmental Panel on Climate Change (IPCC), the United Nations Framework Convention on Climate Change (UNFCCC) and other climate-related bodies, including the results of their meetings and workshops relevant to the Region, and to encourage strong regional involvement in these bodies;
- (d) To provide advice on and assist in the implementation of various climate information and prediction services in the Region for climate-sensitive sectors such as agriculture, fisheries, water, renewable energy, urban and building planning, disaster risk reduction, air quality and health;
- (e) To examine, coordinate, report on and encourage the use of Geographical Information Systems (GIS) in the provision of climate services;
- (f) To provide advice on, assist in identifying, and coordinate attendance at climate-related education and training courses/workshops, including information technology and management courses, based on an assessment of the training requirements in the Region;
- (g) To provide further advice and proposals on the role, structure and operation of the Regional Climate Centres (RCCs)/RCC-Networks in the region, and assist in the processes for seeking their formal WMO designation;
- (h) To provide advice and proposals on other important climate-related issues as they develop and evolve;

- (i) To collaborate and align with relevant and related initiatives in other relevant forums having a common objective, including the Pacific Meteorological Council (PMC) Pacific Islands Climate Services (PICS) Panel and Pacific Islands Education, Training and Research (PIETR) Panel; and
- (j) To report to and advise the president and RA V Management Group on climate related matters.

#### 4. Membership

WG-CLS		Name	Country
<b>Lead</b>		<b>Dr. Flaviana D. HILARIO</b>	<b>Philippines</b>
<b>Vice-Lead</b>		<b>Dr. Christopher GORDON</b>	<b>Singapore</b>
		<b>Prof. Dr. Edvin ALDRIAN</b>	<b>Indonesia</b>
Task Team on Climate Information and Prediction Services including Regional Climate Centres (RCCs) and Regional Climate Outlook Forum (RCOF) (TT-CLIPS)	TT Leader	Mr. John MARRA	USA
	Expert	Mr. Raizan RAHMAT	Singapore
		Mr. Simon McGREE	Australia
Task Team on Climate Data Management/Data Rescue (TT-CDM)	TT Leader	Ms. Meaghan FLANNERY	Australia
	Expert	Mrs. Seluvaia FINAULAH	Tonga
		Mr. Howard DIAMOND	USA
Task Team on Climate Change (TT-CC)	TT Leader	Mr. Jailan SIMON	Malaysia
	Expert	Ms. Thelma A. CINCO	Philippines
Task Team on Use of Improved Tools for Operational Agro-meteorology including Coping with Impacts of Natural Disasters on Agriculture (TT-ITA)	TT Leader	Dr. Andrew TAIT	New Zealand
	Expert	Mr. Haris SYAHBUDDIN	Indonesia
Task Team on Agro-meteorological Information (TT-AIF)	TT Leader	Ms. Edna L. JUANILLO	Philippines
	Expert	Mrs. Nelly Florida RIAMA	Indonesia

## **5. Working Group Meeting**

The first meeting of the re-constituted RA V Working Group on Climate Services (WG-CLS) was held in Singapore from 2-4 February 2016. The report of this meeting can be found in this document as Attachment 1. Note, in particular, the list of agreed actions is in Annex 3 of this report.

## **6. Establishment of two Network Regional Climate Centres (RCCs) in RA V**

At the February meeting, the WG-CLS discussed in detail the plan for implementation of Resolution 5 of the Sixteenth Session of RA V (2-8 May 2014, Jakarta, Indonesia) to establish two WMO RCC-Networks in RA V, one network for the Southeast Asian sub-region and one network for the South-West Pacific sub-region. The WG-CLS agreed on the way forward with concrete steps and actions towards the implementation of the RCC-Networks in these two regions.

Following the meeting, a letter asking for potential contributions to a Network RCC was drafted by the working group to be sent by the RA V President to the PRs in the Southeast Asian sub-region. This letter has been sent and the Secretariat will collate the responses. A proposal will then be developed for the implementation of the RCC demonstration phase.

A letter has been sent to the Chair of the Pacific Meteorological Council asking for endorsement (in principle) of a proposed PI RCC-Network structure involving the following key agencies: NOAA, BoM, NIWA, MeteoFrance, University of Hawaii, SPREP, SPC, USP, CSIRO, NZ MetService, IFRC and University of PNG. Support is being sought from WMO for a meeting of representatives from these agencies to discuss the roles and responsibilities of PI RCC. The proposed meeting will be in Hawaii in November 2016.

## **7. Progress with RCOFs in RA V**

Two RCOF meetings have been held in the Southeast Asian sub-region in the last 12 months. The Fifth ASEAN Climate Outlook Forum (ASEANCOF-5) was organised in Singapore from 18-19 November 2015 by the Meteorological Service Singapore (MSS). This event was supported and co-sponsored by the World Meteorological Organization (WMO) and the US Agency for International Development (USAID). ASEANCOF-5 was attended by the National Meteorological Services (NMSs) of all 10 ASEAN Member countries and was also attended by experts from the WMO Global Producing Centres (GPC): Bureau of Meteorology (BoM) Australia, China Meteorological Administration (CMA), European Centre for Medium-range Weather Forecasts (ECMWF), Japan Meteorological Agency (JMA), National Centers for Environmental Protection (NCEP, NOAA), WMO Lead Center for Long Range Forecast Multi-Model Ensemble (WMO LC-LRFMME), as well as the APEC Climate Centre (APCC), the International Research Institute for Climate and Society (IRI), and the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES). End-user representatives from the hydrological sector, coordinated by the Global Water Partnership South East Asia (GWP-SEA), and from the disaster-risk management agencies, coordinated by the ASEAN Coordinating Centre for Humanitarian Assistance, (AHA Centre) were also present.

The Sixth ASEAN Climate Outlook Forum (ASEANCOF-6) was organised by the Philippine Atmospheric, Geophysical, and Astronomical Services Administration. The ASEANCOF-6 was convened via email correspondence between the National Meteorological Services (NMSs) of all 10 ASEAN Member countries and experts from the WMO Global Producing Centres (GPCs): Japan Meteorological Agency, (JMA), National Centers for Environmental Protection (NCEP, NOAA), Centro de Previsão de Tempo e Estudos Climáticos (CPTEC/INPE), United Kingdom Met Office (UKMO), and WMO Lead Centre for Long Range Forecast Multi-Model

Ensemble (WMO LC-LRFMME). Full reports of both ASEANCOF meetings can be found at: [http://asmc.asean.org/asmc\\_asean\\_cof\\_about/](http://asmc.asean.org/asmc_asean_cof_about/)

The first PICOF was held at the University of the South Pacific in Suva, Fiji, 12-16 October 2015. The forum had a specific focus on the current El Niño and regional and national climate outlooks and impacts on the water sector. Representatives at the forum were from regional organizations, Pacific Islands National Meteorological and Hydrological Services, National water sectors and UN organizations. A Regional Statement on the El Niño and Potential Impacts for the Pacific Islands was produced and circulated to media outlets.

The second PICOF is currently being organized and will most likely be held in Nadi, Fiji, 17-21 October 2016. It will be focused on DRR, looking back at the regional impacts of the previous El Niño and looking forward in preparation for a possible La Niña.

## **8. Agricultural Meteorology**

The PICS Panel Gap Analysis report has been submitted to WMO Commission for Agricultural Meteorology for consideration of publication as a WMO Technical Report.

## **9. RA-V Workshop on Climate Early Warning**

A concept note on a potential RA-V CLEWS workshop has been drafted and this can be found below as Attachment 2. At this stage, the WG-CLS would ask for WMO's feedback on this proposal.

## **ATTACHMENT 1**

WORLD METEOROLOGICAL ORGANIZATION

### **MEETING OF THE RA V WORKING GROUP ON CLIMATE SERVICES (WG CLS)**

2-4 February 2016  
Singapore

FINAL REPORT

#### **1. Opening**

The meeting of the RA V Working Group on Climate Services (WG CLS) was formally opened at 9 a.m. on Tuesday, 2 February 2016 by its Chair Ms Flaviana D. Hilario. She expressed her gratitude to the government of Singapore for hosting the meeting and underlined the goal of the meeting to establish a robust work plan for the Group. On behalf of the Secretary-General of the World Meteorological Organization (WMO), Mr Rupa Kumar Kolli, Chief, World Climate Applications and Services Division addressed the meeting by highlighting the tremendous capacities and potentials in the Region and the respective opportunities for the Group to provide technical support to RA V Members. Mr Chris Gordon, Director, Centre for Climate Research Singapore warmly welcomed the participants to Singapore and stressed the excellent timing of this meeting as the impacts of the current El Nino attract a great interest of governments in relevant climate services.

Eventually, meeting participants introduced themselves during a short *tour de table*.

#### **2. Organisation of the meeting**

The meeting was chaired by WG CLS Chair Ms Hilario. The agenda for the meeting (see Annex 1) was adopted with no revisions. The meeting agreed on its hours of work and other practical arrangements. The list of participants is presented in Annex 2.

#### **3. Review of relevant decisions of Regional Association V**

The meeting participants were briefed on relevant key elements of the RA V Strategic and Operating Plans. The Group also considered climate-relevant outcomes of the Sixteenth Session of RA V (2 – 8 May 2014, Jakarta, Indonesia) as well as of the RA V Regional Forum for Directors of NMHSs in RA V (28 – 30 October 2015, Nadi, Fiji). The Group then reviewed its Terms of Reference and noted, in the context of the above, the multitude of requirements and expectations versus the limited resources available and, therefore, stressed the need to prioritise its actions carefully. While acknowledging different operational arrangements in the Southeast Asian and the South-West Pacific sub-regions of RA V, the Group agreed to closely work together in a way that the entire Region will benefit

from their actions. With this understanding, the Group accepted its Terms of Reference without modifications.

#### **4. Updates on Commission for Climatology (CCI), Commission for Agricultural Meteorology (CAGM) and World Meteorological Congress (Cg)**

The Group was briefed on decisions and outcomes relevant to its work of the Sixteenth Sessions of CCI and CAGM as well as the Seventeenth Session of World Meteorological Congress. Mr Andrew Tait introduced activities of CCI OPACE 4 relevant to RA V and in particular a summary of a regional workshop on the use of sector-specific indices held in Fiji in December 2015. In order to enhance the use of sector-specific climate information in various sectors for climate risk management and adaptation, the workshop was designed to build capacities in interdisciplinary analysis and interpretation of sector-specific climate indices.

#### **5. Global Framework for Climate Services**

Mr Kolli presented an overview of the current status of GFCS. The Group briefly discussed relevant aspects, such as the importance of a strong Research and Development component on Regional levels, prospects of mapping existing climate services activities in RA V into GFCS as well as the importance of in-country training.

Mr Tait introduced recent work of the Pacific Islands Climate Services (PICS) Panel, which priority areas aim at, among others, (i) the Pacific Islands RCOF process, (ii) identifying a minimum set of national climate services, (iii) the establishment of a WMO RCC-Network for the South-West Pacific region as well as (iv) defining core competencies relevant to climate service provision.

The Group discussed in detail the requirements and challenges of establishing, as a priority task, two WMO RCC-Networks in RA V, one network for the Southeast Asian sub-region and one network for the South-West Pacific sub-region. As a result, the WG CLS work plan (cf. Annex 3) includes a number of actions on WMO RCC implementation in RA V.

Mr Edwin Aldrian presented BMKG data visualisation capabilities and Mss Hilario and Juanillo informed of recent PAGASA developments in the areas of data rescue, provision of long-range forecasts (LRF) to farmers, the inauguration of a new information system for data as well as implications of the implementation of weather-based insurances and climate resilience field schools in the Philippines.

#### **6. Current status and future work programme of WG CLS for the period 2016-2018 (Climate)**

Mr Neil Plummer, Australian Bureau of Meteorology (BoM) joined the meeting by video conference. He expressed his regret for his colleague Ms Meaghan Flannery, member of WG CLS, being unable to attend the Singapore meeting. Mr Plummer briefed the Group of current and planned BoM activities relevant to the work of WG CLS, including (i) implementation of the Climate Data Management System CliDE in 14 Pacific Island countries, (ii) data rescue work attached to the CliDE implementation (Pacific Islands data inventory), (iii) PICS Panel discussions regarding WMO RCC establishment in the South-West Pacific region, (iv) the Climate and Ocean Services Program in the Pacific (COSPPac) including the SCOPIC seasonal forecasting system, and (v) plans to improve Early Warning Systems in the region. He suggested to the Group to consider extending some of the approaches above to other parts of RA V.

Mr Peer Hechler briefed the Group on recent developments in the domains of climate data management including data rescue as well as climate monitoring by referring to

respective CCI OPACE 1 and 2 Expert- and Task Team activities as well as national and regional implementation projects.

Messrs John Marra and Raizan Rahmat provided an overview of the PICOF and ASEANCOF processes.

The Group discussed the above topics and agreed on a couple of actions, which form the key elements of the WG CLS work plan (cf. Annex 3).

## **7. Current status and future work programme of WG CLS for the period 2016-2018 (Agricultural Meteorology)**

Mr Tait introduced outcomes of a PICS Panel gap analysis, highlighting agrometeorological aspects, including gaps in (i) feedback on the use of climate outlooks by the agricultural sector, (ii) training for the agricultural sector on climate matters, (iii) research on climate impacts on the agricultural sector, and (iv) efficient communication with the agricultural sector (and vice versa). It was agreed to explore opportunities to invite Working Group member Ms Nelly F. Riama, Indonesia to one of the upcoming PICOFs in order to address the BMKG Climate Field Schools and discuss agrometeorological aspects relevant to the COF process.

## **8. Extra-budgetary projects and resource mobilisation**

The Group noted with appreciation the support of USAID to the ASEANCOF process as well as the prospects of the on-going GFCS Canada project for the development of climate services in the Pacific Island countries.

## **9. Any other business**

Participants agreed on the need to raise the visibility of the Working Group and its activities within the Region. It was agreed to explore opportunities to create a Web presence of the Working Group within the Webpages of the WMO Regional Office for Asia and South-West Pacific (RAP) and to reflect activities of the Group on the Webpages of the NMHS of the Philippines (PAGASA).

## **10. Conclusions and recommendations**

The Group agreed to establish the set of actions captured in Annex 3 as work plan for the current intersessional period.

## **11. Review of actions and adoption of the meeting report**

The Group reviewed and adopted its action list as per Annex 3 to this report.

## **12. Closing**

The Chair thanked Mr Gordon and his team for the excellent arrangements provided, which allowed the Working Group to efficiently focus on its agenda items. She also appreciated the proactive participation of meeting attendees in the Group's discussions.

The meeting was closed by its Chairperson on Thursday, 4 February at 3.26 p.m.



WORLD METEOROLOGICAL ORGANIZATION

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MEETING OF THE RA V WORKING GROUP  
ON CLIMATE SERVICES (WG CLS)  
Singapore, 2 – 4 February 2016

Original: English

**AGENDA**

1. **OPENING OF THE MEETING**
2. **ADOPTION OF THE AGENDA AND ORGANIZATION OF THE MEETING**
3. **REVIEW OF RELEVANT DECISIONS OF REGIONAL ASSOCIATION V**
4. **UPDATES ON COMMISSION FOR CLIMATOLOGY, COMMISSION FOR AGRICULTURAL METEOROLOGY AND WORLD METEOROLOGICAL CONGRESS**
5. **GLOBAL FRAMEWORK FOR CLIMATE SERVICES**
6. **CURRENT STATUS AND FUTURE WORK PROGRAMME OF WG-CLS FOR THE PERIOD 2016-2018 (CLIMATE)**
7. **CURRENT STATUS AND FUTURE WORK PROGRAMME OF WG-CLS FOR THE PERIOD 2016-2018 (AGRICULTURAL METEOROLOGY)**
8. **EXTRA-BUDGETARY PROJECTS AND RESOURCE MOBILIZATION**
9. **ANY OTHER BUSINESS**
10. **CONCLUSIONS AND RECOMMENDATIONS**
11. **REVIEW OF ACTIONS AND ADOPTION OF THE MEETING REPORT**
12. **CLOSURE OF THE MEETING**

WORLD METEOROLOGICAL ORGANIZATION

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MEETING OF THE RA V WORKING GROUP  
ON CLIMATE SERVICES (WG CLS)  
Singapore, 2 – 4 February 2016

Original: English

**List of Participants**

Neil PLUMMER (Mr), **Australia**, N.Plummer[at]bom.gov.au  
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Peer HECHLER (Mr), **World Meteorological Organisation**, pechler[at]wmo.int  
Rupa Kumar KOLLI (Mr), **World Meteorological Organization**, rkolli[at]wmo.int

**List of actions (reflecting key work plan elements of the RA V WG CLS)**

<b>Action</b>	<b>Facilitator</b>	<b>Deadline</b>	<b>Remarks</b>
1: Draft a concept paper on prospects of a Regional Climate Change Forum in RA V, based on the RCOF concept, with the goal of holding such forum in 2017	TT-CC (Mr Simon)	31 Oct 16	Include aspects of keeping RA V NMHSs informed of relevant CORDEX activities in their region;  <i>Liaise with TT-CSIS (Mr Marra), Ms Cinco and Mr Aldrian</i>
2: Survey on capacity building needs for climate services	TT-CSIS (Mr Rahmat)	(next ASEAN COF)	Consider template/outcome of similar South Asian COF survey (Mr Kolli) and take into account outcomes of the PICS Panel gap analysis (Mr Tait); consider conducting the survey during an ASEAN COF event
3: Liaise with ET NCMP to address RA V specifics regarding NCMP implementation	TT-CDM (Mr Diamond)	31 Aug 16	(ET NCMP contact point for RA V: Mr Karl Braganza, BoM); discuss NCMP generation for small Island countries and for complex terrain areas  <i>Liaise with TT-CSIS (Mr Marra)</i>
4: Encourage and assist RA V Members in populating I-DARE	TT-CDM (Ms Flannery)	30 June 17	
5: Draft a concept note on a potential RA V Workshop on Climate Early Warning in 2017	Mr Tait	30 June 16	Consider existing capabilities and mechanisms in the Region, identify stakeholders, draft agenda elements, consider WMO Climate Watch concept and related workshop series  <i>Liaise with Messrs Plummer (BoM), Gordon, Marra and Hechler</i>
6: Find out which RA V Members submit contributions to (i) WMO's Annual Statement on the Status of the Global Climate and (ii) BAMS State of the Climate article	Mr Hechler	30 June 16	Encourage more RA V Members to contribute through a P/RA V letter to RA V Members <i>in close liaison with the RA V WG CLS</i>
7: Draft a three to five years roadmap for the further evolution of RA V RCOFs	TT-CSIS (Mr Marra)	31 Oct 16	Include discussion of (i) challenges and opportunities, (ii) prospects of adding new variables to RCOF portfolios (e.g. sea level, wind at standard levels etc.), (iii) prospects of adding the sub-seasonal forecast scale to RCOF portfolios, (iv) Outlook uptake by users, (v) Outlook impacts on user decisions; (vi) aspects of NCOF liaison; (vii)

			<p>how best to inform of ongoing projects in the region etc.</p> <p><i>Liaise with Messrs Tait and Gordon; consider inviting Ms Riama and Mr Rahmat to one of the next PICO face-to-face meetings</i></p>
8: Facilitate RA V RCC implementation	TT-CSIS (Messrs Marra, Tait, Gordon)	(Cf. column Remarks)	<p>Advice P/RA V on RCC-Network arrangements and implementation steps for Southeast Asian and Southwest Pacific sub-regions with the aim of starting demonstration phases:</p> <p><u>8.1: Southwest Pacific RCC-Network:</u> (i) Approach potential RCC Node organizations to seek informal agreement to serve the RCC-Network <b>(15 Mar 16)</b>; (ii) seek PMC endorsement through PICS Panel <b>(31 Mar 16)</b>; (iii) develop detailed RCC-Network proposal (including suggested start date of RCC demonstration phase) <b>(31 Oct 16)</b>; (iv) conduct a face-to-face meeting of RCC Node/consortium candidate institutions to agree on organizational arrangements and technical details <b>(Nov 16)</b>; (v) seek formal commitment from PRs of proposed Node hosts and potential consortium members; (vi) provide RCC-Network proposal to P/RA for endorsement to start the demonstration and for submission to WMO SG</p> <p><u>8.2: Southeast Asian RCC-Network:</u> (i) Arrange for a letter from P/RA V to Southeast Asian RA V Members to inquire interest/willingness/readiness to serve as RCC-Network provider (Node lead or consortium member) <b>(29 Feb 16)</b>; (ii) develop detailed RCC-Network proposal (including suggested start date of RCC demonstration phase) <b>(31 May 16)</b>; (iii) conduct a face-to-face meeting of RCC Node/consortium candidate institutions to agree on organizational arrangements and technical details <b>(June/July 16)</b>; (iv) seek formal commitment from PRs of proposed Node hosts (and potential consortium Members); (v) provide RCC-Network proposal to P/RA for endorsement to start the demonstration and for submission to WMO SG</p>
9: Explore ways of publishing the outcomes of the PICS Panel gap analysis as a WMO technical report	TT-ITA (Mr Tait)	30 June 16	<p>In addition, consider provision of an article for the WMO Bulletin</p> <p><i>Liaise with Mr Stefanski (Secretariat)</i></p>
10: Draft a report on the operational use of S2S	TT-ITA (Mr Tait)	31 Dec 16	<p>Consider existing approaches in Southeast Asia and address relevant potential recommendations for the Southwest Pacific region</p>

forecasts in agriculture			<i>Liaise with Mr Stefanski (Secretariat)</i>
11: Draft a brief report on the use of remote sensing data and services for agricultural applications	TT-ITA, TT-CSIS (Messrs Tait and Marra)	31 Dec 17	(Report of a length of up to five pages)
12: Draft a paper on NCOF practices and experiences	TT-AIF (Ms Juanillo)	30 June 17 (annotated paper out- line: 31 Oct 16)	Consider existing practices and experiences in countries such as Philippines and Indonesia with a special focus on agriculture (including Indonesian Climate Field Schools); provide general recommendations/guiding principles/ practices regarding NCOFs for WMO Members worldwide  <i>Liaise with Ms Riama and Messrs Gordon and Aldrian and NN (Malaysia)</i>
13: Facilitate an online meeting of the RA V WG CLS	Ms Hilario, WMO RAP	Feb 17	Review status of actions and explore opportunities for additional actions, where appropriate
14: Identify RA V WG CLS members who are not able to contribute to the activities of the WG	Ms Hilario	Ongoing	Consider quarterly checks (Mr Kolli to set up a Google group for the entire WG); complement 'silent' members by engaging additional experts as appropriate
15: Update RA V-related WMO DRA Webpages	WMO RAP	30 April 16	Update information on working groups, membership in working groups and teams; consider prospects of providing space for WG activities etc.

## **ATTACHMENT 2**

### **Concept note: RA-V Workshop on Climate Early Warning**

Draft version 3 (24/2/2016)

#### **1. Introduction**

As understanding of the climate system grows and society becomes more aware of the potential benefits from use of this knowledge, communities and decision makers are seeking guidance and tools for accurate early warning of climate-related impacts.

Recognizing the need to strengthen the production, availability, delivery and application of science-based climate monitoring and prediction services, the WMO World Climate Conference – 3 held in Geneva from 31 August to 4 September 2009, proposed to establish a Global Framework for Climate Services (GFCS). Subsequently, the 16th World Meteorological Congress (CgXVI, Geneva, Switzerland) decided to support and facilitate the implementation of the GFCS as a priority of the organization. The Congress also recognized that Expert and Task Teams from WMO Technical Commissions (especially the Commission for Climatology, CCI) and Regional Associations will play a central role in the implementation of the GFCS.

The WMO Regional Association V (South-east Asia and South-west Pacific) Working Group on Climate Services (WG-CLS) has five Task Teams dedicated to the advancement of studies and the sharing of knowledge on topics from climate data management to the provision of tailored climate information for farmers. Encompassing all these topics (and more) is the concept of Climate Early Warning.

Climate Early Warning is ultimately about providing timely advice to stakeholders on how the climate at a global, regional and national scale is currently evolving and the likelihood that a potentially adverse event (or events) may develop in the next few months. Such an event might be a drought, an extended period of low (or high) sea level, an enhanced risk of tropical cyclone activity, or the expectation of unusual winds and rainfall. In order to provide such advice, there are three main components that together make up a Climate Early Warning System (CLEWS). These are: infrastructure, data & products, and service delivery.

The overarching aim of this workshop is to bring together those currently responsible for issuing climate forecasts and warnings from National Meteorological and Hydrological Services (NMHSs) across the RA-V region to discuss and demonstrate (using examples) what Climate Early Warning is and how a CLEWS can be implemented. Invited guests will also include key end users, such as representatives from Disaster Management Offices and/or NGOs (such as Red Cross). The workshop will be held in Apia, Samoa where significant advances have been made over the last few years on a national CLEWS. The date of the workshop is still to be determined, but will be sometime in 2017 probably lasting three days.

#### **2. Objectives of the workshop**

1. To demonstrate the concept and key components of Climate Early Warning to representatives from NMHSs across RA-V who produce and deliver climate services;
2. To share experiences and learn from examples of Climate Early Warning Systems (or components thereof) from across RA-V (and possibly further afield);

3. To listen to end-users' perspectives on their responses to and need for Climate Early Warnings;
4. To identify linkages with other concepts such as Climate Watches; Climate Risk Management and Climate Risk and Early Warning Systems (CREWS);
5. To discuss Climate Early Warning in the context of the Global Framework for Climate Services, Regional Climate Centres, and any other regional and global programmes and initiatives; and
6. To assess gaps and needs of RA-V NMHSs in the establishment of Climate Early Warning Systems.

### **3. Expected outcomes**

1. A description of the baseline of NMHS institutional and operational capabilities for Climate Early Warning across RA-V;
2. Improved understanding of Climate Early Warning concepts and their use in enhancing the capacity of NHMSs to better respond to key climate services requirements;
3. Identification and demonstration of the key components of a Climate Early Warning System, ultimately for implementation in all RA-V countries; and
4. Formation of a writing team to produce a WMO technical publication on Climate Early Warning in RA-V.

### **4. Workshop basic structure\***

Day 1	<ul style="list-style-type: none"> <li>• Introduction to CLEWS concept and key components</li> <li>• Context setting: GFCS, RCCs, National Frameworks, etc.</li> <li>• End-users' perspectives</li> <li>• Linkages with Climate Watches, CRM, CREWS, etc.</li> <li>• Learnings from COSPPac, Climate Dialogues, Climate Field Schools, Clide/Clidesc, other global initiatives, etc.</li> <li>• Field trip</li> </ul>
Day 2	<ul style="list-style-type: none"> <li>• Key component 1: Infrastructure requirements (instrumentation, comms, databases, IT hardware and support, upgrades)</li> <li>• Key component 2: Data &amp; products (data ingest, QC, data rescue, data management, product generation, software, tools, training, upgrades)</li> </ul>
Day 3	<ul style="list-style-type: none"> <li>• Key component 3: Service delivery (survey of needs, timing, format, comms, NCOFs, service support, training)</li> <li>• NMHS gaps and needs analysis</li> <li>• Writing team formation and plan</li> <li>• Wrap up</li> </ul>

\* Note, the key components could be reversed, so that service delivery is presented first. This would help to drive the discussion from the "requirements for actionable information" side.

## **Working Group on Infrastructure (WG-INFR)**

Karl Monnik  
Bureau of Meteorology, Australia

### **1. Introduction**

The RA V Working Group on Infrastructure was inaugurated in 2015, after the term of the previous team came to an end in early 2015.

### **2. Working Group Structure**

The Working Group is composed of one leader and vice-leaders, Task Team on WIGOS (TT-WIGOS), Task Team on Satellite Utilization (TT-SU); Task Team on Aircraft Based Observations (TT-ABO); Task Team on Observations Quality Management (TT-OQM); and Task Team on Regional Implementation and Operation of WIS (TT-WIS). Each TT consists of one leader and expert except for Task Team on WIGOS (TT-WIGOS).

### **3. Terms of Reference**

The terms of reference of the Working Group on Infrastructure (WG-INFR) are as follows:

- (a) To monitor, promote and develop strategies for the Regional development and sustainable implementation of the WMO Information System (WIS), including the steps described in the WIS Implementation Plan for Regional Association V (South-West Pacific). A high priority remains for overcoming the persistent shortcomings of the Regional Meteorological Telecommunication Network for time-critical and operation critical data exchange. Avenues include Pacific-wide satellite communications, collaboration in the development and support of the RAdio and InterNET (RANET) communication system, reception of the Emergency Managers Weather Information Network, and improved access to Internet services;
- (b) To monitor, promote and develop integrated strategies for the Regional development and sustainable implementation of the observing systems of WMO Programmes and co-sponsored Programmes, in particular through the WMO Integrated Observing System (WIGOS) Implementation Plan for Regional Association V (South-West Pacific). Specific areas of focus are tabulated in that plan;
- (c) To promote and facilitate the compliance of the WIGOS and WIS Technical Regulations and Manuals;
- (d) To review and propose updates for the Regional WIGOS Implementation Plan;
- (e) To identify means for strengthening liaison with bodies involved in the development and implementation of relevant observing and information systems;
- (f) To identify education and training requirements for relevant information and communication techniques and observing systems and operations;
- (g) To provide input for WMO regulatory material related to observations and information systems, in particular ensuring National Focal Points effective participation in Fast Track procedures approved under Resolution 21 (Cg-17);
- (h) To coordinate its Task Teams to complete specific tasks and submit proposals to the RA V Management Group for winding up completed teams and starting new teams;
- (i) To report to and advise the president and Management Group of the Association on the above issues.



#### 4. Membership

WG-INFR		Name	Country
<b>Lead</b>		<b>Mr Karl MONNIK</b>	<b>Australia</b>
<b>Vice-Lead</b>		<b>Mr Edward TRIHADI</b>	<b>Indonesia</b>
Task Team on WIGOS (TT-WIGOS)	TT Leader	Mr Karl MONNIK	Australia
Task Team on Satellite Utilization (TT-SU)	TT Leader	Ms Agnes LANE	Australia
	Expert	Mr Vicente P. PALCON, JR.	Philippines
Task Team on Regional Implementation and Operation of WIS (TT-WIS)	TT Leader	Mr Huat Aik CHOO	Singapore
	Expert	Mrs Endang PUDJIASTUTI	Indonesia
Task Team on Observations Quality Management (TT-OQM)	TT Leader	Mr Wan Nazri WAN DAUD	Malaysia
	Expert	Mr Selusalema VITE	Tonga
Task Team on Aircraft Based Observations (to be formed only if experts are available) (TT-ABO)	TT Leader	Mr Syamsul HUDA	Indonesia
	Expert	Mr Douglas BODY	Australia

#### 5. Task Team on WIGOS (TT-WIGOS)

Activities of the TT:

The TT Lead contributed to the development of WMO Regulatory Material concerning surface based observations (Automatic Weather Stations) and the WIGOS Metadata Standard. Furthermore, he has contributed to the preparation of Guidance material for OSCAR Surface on behalf of RA V.

- Future plan/Work Plan
  - o Guide the development of national WIGOS Implementation Plans;
  - o Organize regional workshops for managers of weather and climate observations to discuss WIGOS.
  - o Assess and provide profiles of national observing systems and networks against WIGOS requirements / standards.
- Challenges and Priorities
  - o Develop national WIPs;
  - o Facilitate that each NMHS can become WIGOS ready by 2019.

#### 6. Task Team on Satellite Utilization (TT-SU)

Activities of the TT:

- Two WebEx sessions were held by members of the group and a number of other interested participants.
- Future plan/Work Plan
  - o Assist Members in the Pacific subregion to receive data from the new generation of geostationary meteorological satellites such as Japan's Himawari-8.
  - o Document RA V user requirements and priorities for satellite data and products;
  - o Document regional satellite requirements using CBS / Space programme guidelines.
- Challenges and Priorities

- Address constraints in providing members of the subregion to access from Himawari-8.
- Developing a process to access Himawari rapid scan data for significant weather conditions

## **7. Task Team on Regional Implementation and Operation of WIS (TT-WIS)**

- Future plan/Work Plan
  - Develop national WIS implementation plans or equivalents for Members of RA V based on ASBU's road map, WIS RAV Implementation Road Map
  - Implement RA V WIS implementation plan.
  - Organize regional workshops on WIS.
- Challenges and Priorities
  - Increase capability in NMHS in WIS.

## **8. Task Team on Observations Quality Management (TT-OQM)**

- The Lead of this team was replaced in early 2016 and the team is yet to become active.
- Future plan/Work Plan includes:
  - To enable NMHS to access RICs to calibrate meteorological instruments;
  - Enhance the capacity of Members in RA V to achieve traceability.
  - Monitor and detect discrepancies between current performance and the metadata lodged with WMO.
  - Implement new WIGOS metadata standards in Members of RA V.
- Challenges and Priorities
  - Improve calibration of national standards in NMHS;
  - Implement new WIGOS metadata standards
  - Contribute to the development of Regional WIGOS centre.

## **9. Task Team on Aircraft Based Observations (TT-ABO)**

- A WebEx meeting was held jointly with members of TT-ABO on 8 April 2016. Attendance included: Dean Lockett (WMO Secretariat); Frank Grooters (Chair CBS ET-ABO); Doug Body (BOM, Member RA V INFRA-ABO); Karl Monnik (BOM, Chair RA V INFRA); Wim Van Dijk (NZ MetService, NZ AMDAR Focal Point). Key items discussed included:
  - Draft RA V Regional Implementation Plan (developed prior to RA V Meeting in May 2014) was discussed – in particular the areas that need to be updated to reflect changes in ABO in RA V.
  - The addition of Mr Wim Van Dijk (New Zealand MetService) to RA V INFRA-ABO as an Associate member.
  - The possibility of holding a Regional Workshop on AMDAR, supported by WMO. It was suggested to be held in November 2016 in Indonesia. Dean Lockett (WMO) is going to start discussions with Mr Huda.
- Future plan/Work Plan
  - Implement Aircraft-Based Observations Implementation Plan for RA V within the perspective of GANP.
  - Discuss with Pacific national and regional airlines participating in AMDAR observations programme.
- Challenges and Priorities
  - Identify new potential airlines opportunities for access AMDAR observations;
  - Plan an AMDAR workshop in RA V.

## **10. Working Group Meeting**

- Members of WG-INFR participated in the Regional Forum for Directors of National Meteorological and Hydrological Services in Regional Association V (South-West Pacific), Nadi, Fiji, 28–30 October 2015.
- A meeting of the WG is provisionally scheduled for early 2017. The details of the meeting are still under the discussion.
- Challenges and Priorities (Annex)
  - o Develop active participation by TT Leads in pursuing their plans.
  - o Improve communication between TT members across RA V.

## **11. Conclusion**

WG-INFR faces many challenges to develop momentum among the Task Teams. Following the Regional Forum for Directors of National Meteorological and Hydrological Services in Regional Association V (South-West Pacific), where some face-to-face meetings were held, there is greater opportunity to pursue TT work programs via email and WebEx.

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**RECOMMENDATIONS OF THE REGIONAL FORUM FOR DIRECTORS OF NMHSs IN RA V****<Disaster Risk Reduction and Service Delivery>**

1) The Regional Forum recognizes that the Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) calls on States to: enhance and strengthen MHEWS (par 14, 25); develop and invest in regional multi-hazard early warning mechanisms (par 34-c); and achieve the global target for MHEWS (par 18-g - Substantially increase the availability of and access to MHEWS and disaster risk information and assessments to the people by 2030).

2) The Regional Forum requests WMO Secretariat in coordination with the EC Working Group on DRR develops and distributes a guide or information bulletin for Members; the guide to contain a concise description of the SFDRR and its likely implications for Members. The guide should further contain information covering the hierarchy of responses from the global to the local level and include suggestions relating to how Members could interact with relevant stakeholders at those levels.

3) It is recognized that moving toward impact based forecasting and risk based warnings is essential for all Members and requires support in order to be successful. As change will be a progressive process, sharing of experiences between Members is encouraged and will be coordinated by the RA V WG-WXS.

4) Further, the Forum requests WMO Secretariat that future WMO training of impact based forecasting and risk based warnings considers the specific needs of RA V Members as identified by the RA V Management Group.

**<Enhancement of National and Regional Climate Services>**

1) Effective communication of long range forecast information to stakeholders was identified as a significant issue. Some countries and bodies (e.g. Australia, Indonesia and RIMES) have considerable experience in communication of this forecast information. The development of impact-based and risk-based forecast information will enable its more effective application by end users. Consideration should be given to developing mechanisms to provide appropriate skills training to meteorological personnel and to enable the sharing of effective communication processes across RA V.

2) Appropriate mechanisms need to be identified to enable sustained funding of ASEANCOF and PICOF. WMO was requested to assist in providing or seeking sustained funding in this respect.

3) The establishment of RCC-Networks will be important to address the various issues identified within the RCOFs. The RA V WG CLS is requested to convene as soon as possible to take forward the process to establish RCC-Networks for the Southeast Asian and PICT regions, the latter in collaboration with the Pacific Islands Climate Services (PICS) Panel.

4) The sub-seasonal to seasonal timescales was noted of particular importance in the Region. WMO is requested to look into including RA V as a special region of interest within the WMO-S2S programme (note that Africa is already a focus region, with an emphasis on applications).

5) Good progress has been made by BMKG in the establishment of SACA&D. Members in the Region are encouraged to contribute data to the SACA&D database.

6) There is a need to address the current gaps in the Regional Basic Synoptic Network in the Pacific. The Climate Information Early Warning System (CLEWS) is one means to identify the gaps.

**<Aviation Services in Southeast Asia and the Southwest Pacific>**

1) The Forum recommended WMO WG WXS to:

- i. Identify and document current baseline and needs of RA V regarding: training (WMO 2016 requirements), QMS (migration to ISO 9001:2015), cost recovery, and data formats (GML/XML);
- ii. Provide these identified needs to Secretariat (through chair WG WXS);
- iii. Establish long term plan and roadmap in collaboration with PMC PIAWS Panel;
- iv. Identify and map the linkages between PMC, RA V WG-WXS, WMO relevant technical commissions and to ICAO to ensure effective coordination; and
- v. Consider realigning structure and TOR of RA V WG-WXS to better meet needs of SIDS and PMC PIAWS Panel.

2) The Forum also recommended to:

- i. Request CAeM to assist RA V Members in implementing robust TAF verification scheme to ensure sound underlying basis for QMS;
- ii. Request CAeM and WMO Secretariat to develop additional guidelines specifically for negotiations on the development of aviation cost recovery schemes with relevant stakeholders;
- iii. Present the training needs of RA V members regarding met observers at the upcoming CAeM ET-ETC meeting;
- iv. Support the Pilot Project on cross border coordination of SIGMETS in view of developing guidelines to Members States;
- v. Ensure that forecasters are actively engaged in the development of SOPs, as part of QM, to ensure sufficient initiative and flexibility;
- vi. Clarify the status of Government level Service Level Agreements (SLAs) regarding aviation weather services;
- vii. Coordinate with National Civil Aviation Authorities to ensure the participation of pacific experts in ICAO-MET Meetings; and
- viii. Clarify the status of the certification process of US funded and country funded aviation observers for the Republic of Marshall Islands, Republic of Palau, and Federated States of Micronesia.

#### **<Partnership and Cooperation including Programme for WMO SIDS and Member Island Territories>**

1) That as a matter of priority, a strategic work plan be developed for the new Programme for WMO SIDS and Member Island Territories.

2) The Forum welcomes the establishment by Cg-17 of WMO Programme for WMO SIDS and Member Island Territories and strongly recommends its operationalization as soon as possible. In this regard, the Forum:

- i. Requests WMO Secretariat to expedite the allocation of responsibilities and resources for the Programme within DRA department.
- ii. Requests the President of RA V to initiate discussion with other PRAs concerned in order to develop a coordinated 1st draft of prioritized activities focused on SIDS to be presented at the PRA-2016 meeting in January 2016.
- iii. Based on the outcome of PRA-2016, further proposals on priorities, activities and related resource needs of the SIDS Programme should be submitted for consideration by the EC WG on SOP (February 2016) and EC-68 (June 2016).

3) That existing coordination mechanisms (e.g. Pacific Meteorological Desk Partnership) continue to be supported and strengthened to ensure effective harmonization and cooperation between the various capacity development and related activities occurring in the Region.

4) That the Terms of Reference of the RA V subsidiary bodies be updated to address Members' needs around: (a) tsunami warning systems and services (e.g. under a Tropical Cyclone Committee Task Team on Coastal Inundation including Storm Surge (CISS)) to ensure coordination with UNESCO-IOC PTWS/ICG South West Pacific Working Group on Tsunami Warning and Mitigation, and (b) SIDS priorities.

**TERMS OF REFERENCE FOR RA V WORKING GROUPS AND TROPICAL CYCLONE COMMITTEE****Working Group on Weather Services(WG-WXS)**

- (a) To monitor, promote and develop strategies to enhance the capabilities of RA V Members to deliver and improve access to weather services, with an focus on sustainable aviation weather services;
- (b) To coordinate with WMO, the International Civil Aviation Organization and other key organizations to assist with the implementation of an improved and sustainable weather and warning service;
- (c) To identify and evaluate international best practices on the delivery of weather and warning services and communicate these to RA V Members;
- (d) To establish and coordinate task teams, as necessary, to complete specific tasks related to the objectives and priority areas of the Working Group;
- (e) To report and provide advice to the RA V Management Group on the above issues;

**TASK TEAM ON COST RECOVERY (TT-CR)**

The Terms of Reference of the Task Team are:

- Maintain awareness of current international developments in cost recovery;
- Maintain awareness of the current status and methods of cost recovery in RA-V member countries;
- Provide guidance and assistance in the development and implementation of a cost recovery framework.

### **TASK TEAM ON QUALITY MANAGEMENT (TT-QM)**

The Terms of Reference of the Task Team are:

- Maintain awareness of the implementation of quality management systems within NMHS in RA-V;
- Maintain awareness of the implementation of quality management systems within NMHS in RA-V;
- Assist in the development and implementation of QMS within NMHS in RA-V;
- Continually seek ways to improve the effectiveness of implementing QM by regional collaboration and mentoring.

### **TASK TEAM ON FORECASTER COMPETENCIES & TRAINING (TT-TRG)**

The Terms of Reference of the Task Team are:

- Maintain awareness of current international developments in standards and guidance for forecaster and observer qualifications and competencies, in particular the work of the WMO CAeM expert team and the WMO Education and Training Programme;
- Maintain awareness of the current status of forecaster and observer qualifications and competency within RA-V member countries;
- Assist in the development and implementation of competency assessment systems in RA-V;
- Encourage the collaboration of RA-V countries in implementing a competency framework.

### **TASK TEAM ON WEATHER SERVICES IMPLEMENTATION (TT-IMP)**

The Terms of Reference of the Task Team are:

- Maintain awareness of current international developments in standards and practices for weather services and products relevant to RA-V;
- In conjunction with the relevant WMO programmes, maintain awareness of the current status of the different weather services products available in RA-V member countries and their conformity to international standards and practices;
- Assist in the development and implementation of any required weather services in RA-V;
- Encourage the collaboration of RA-V countries in implementing any required weather services.

### **WMO RA V WORKING GROUP ON HYDROLOGICAL SERVICES (WG-HYS)**

- (a) To monitor, promote and develop strategies and activities that will enhance the capabilities of RA V Members to improve the quality of hydrological services and to deliver and improve access to these services, with an emphasis on improved observation and monitoring systems;
- (b) To coordinate with relevant WMO bodies, particularly the Commission for Hydrology, and other groups to enable improved forecasting capabilities, including the provision

of more accurate, timely and reliable forecasts and warnings and enhanced delivery of related information and services;

- (c) To assist RA V Members to apply a quality management approach that will enable and support the sustainability of hydrological services;
- (d) To provide hydrological advice and guidance to RA V regarding the development of the new WMO programme for SIDS and Member island territories;
- (e) To establish and coordinate task teams, as required, to complete specific activities related to the objectives, priority areas and planned deliverables of the Working Group;
- (f) To report and provide advice to the RA V Management Group on the above issues;

#### **TASK TEAM ON TRAINING AND CAPACITY BUILDING IN HYDROLOGY (TT- TCB-H)**

The Terms of Reference of the Task Team are:

- Assess the Education and Training needs (ETR) in HWR in the region and prepare with the assistance of the Secretariat a realistic plan to respond to highest priority needs;
- Contribute to the preparation of relevant training material for courses of regional interest;
- Guide the design and implementation of potential regional and sub-regional components of WHYCOS in RA V;
- Support the potential development of a SEA-HYCOS and a Phase 2 of Pacific-HYCOS; and
- Provide advice to the WG-HYS on the above issues.

#### **TASK TEAM ON HYDROLOGY DATA MANAGEMENT AND QMF-H (TT- HDM/QMF-H)**

The Terms of Reference of the Task Team are:

- Support the implementation of QMF-Hydrology in Region V;
- Continually seek ways to improve the effectiveness of implementing and maintaining QMF- HYDROLOGY by regional collaboration and mentoring;
- Promote the use of WMO Manuals and Guidelines in Region V;
- Assist in the adoption of standardization measures in Region V;
- Promote data exchange and availability at national, regional and global level;
- Assist NHSs in selection of appropriate, robust and sustainable DBMSs; and
- Provide advice to the WG-HYS on the above issues.

#### **TASK TEAM ON DISASTER RISK REDUCTION –WATER-RELATED DISASTERS (TT- DRR-W)**

The Terms of Reference of the Task Team are:

- Promote coordinated activities on operational flood forecasting in Region V particularly with respect to impact-based products and services;
- Take the lead in identifying and sharing information on available tools or



methodologies including telemetered data acquisition, flood forecasting tools, and information products suitable for Disaster Risk Reduction (DRR) agencies and communities;

- Promote best practice flash flood forecasting and warning services in RA V; and
- Provide advice to the WG-HYS on the above issues.

#### **TASK TEAM ON WATER AND CLIMATE (TT-WC)**

The Terms of Reference of the Task Team are:

- Promote coordinated activities on climate change and climate variability related to hydrology and the water resources sector, including drought vulnerability, in Region V;
- Support development of products to assist national and regional strategies for adaptation to climate change in the water sector; and
- Provide advice to the WG-HYS on the above issues.

#### **WMO RA V WORKING GROUP ON CLIMATE SERVICES (WG-CLS)**

- (a) To coordinate observational aspects of climate services including through liaison with the Global Framework for Climate Services, the Global Climate Observing System and the Global Ocean Observing System;
- (b) To provide advice on methods to strengthen and improve climate system monitoring, analyses and indices;
- (c) To keep abreast of the activities of the World Climate Services Programme, Commission for Climatology, the World Climate Research Programme and its core research projects, Global Framework for Climate Services, the Intergovernmental Panel on Climate Change, the United Nations Framework Convention on Climate Change and other climate-related bodies, to report results of meetings and workshops, and to encourage strong regional involvement in these bodies;
- (d) To provide advice on and assist in the implementation of various climate information and prediction services in RA V in climate-sensitive sectors such as agriculture, water, renewable energy, urban and building planning, disaster risk reduction, air quality and health;
- (e) To examine, coordinate, report on and encourage the use of Geographical Information Systems in the provision of climate services;
- (f) To provide advice on, assist in identifying and coordinate attendance at climate-related education and training courses/workshops, including information technology and management courses, based on a survey of the training requirements in the Region;
- (g) To provide further advice and proposals on the role, structure and mechanism of the Regional Climate Centres in the region, and assist in seeking their WMO designation processes;
- (h) To provide advice and proposals on other important climate-related issues as they develop and evolve.

### **TASK TEAM ON CLIMATE SERVICES INFORMATION SYSTEM (TT-CSIS)**

The Terms of Reference of the Task Team are:

- To provide advice on and assist in the implementation of various climate information and prediction services in RA V, in the various climate-sensitive sectors, including through Regional and National Climate Outlook Forums and Regional Climate Centres;
- To provide advice on, assist in identifying and coordinate attendance at climate-related education and training courses/workshops, including information technology and management, based upon a survey of the training requirements in the Region;
- To provide further advice and proposals on the role, structure and mechanism of the Regional Climate Centres in the region including their designation process;
- To review and provide advice/guidance on the use of statistical and dynamic climate modeling and downscaling to produce useable regional and national climate forecasts and products;
- To provide advice and proposals on other important climate-related issues as they develop and evolve;
- Encourage the collaboration of RA V countries to enhance technical capacities in seasonal prediction;
- Provide advice to the WG-CLS on the above issues.

Within these Terms of Reference, the Task Team will seek to collaborate and align with regional meteorological communications work done in other relevant forums having a common objective.

### **TASK TEAM ON CLIMATE DATA MANAGEMENT / DATA RESCUE (TT-CDM)**

The Terms of Reference of the Task Team are:

- To provide advice on methods and mechanisms, including through the International Data Rescue Portal (I-DARE) and other means in the region to identify the needs in data rescue and related technologies for project design and implementation;• Ensure technological watch on the development of new climate data bases and provide advice on their management systems that can be made available to the NMHSs for their modern archiving of climate data and generating data products and services, based on WMO Climate Data Management specifications and guidelines;
- Assess the existing methodologies for quality control and homogenization of climate data and provide advice on their suitability for their use in developing high quality climate datasets;
- To investigate existing best practices and tools for generating climate monitoring products and provide recommendations on their implementation at national and regional level;
- Assess the region needs in training on climate data management and related applications, such as for producing timely information on weather and climate extremes in support of climate watch and alert systems

Within these Terms Of Reference, the Task Team will seek to collaborate and align with regional meteorological communications work done in other relevant forums having a

common objective.

### **TASK TEAM ON CLIMATE CHANGE (TT-CC)**

The Terms of Reference of the Task Team are:

- To keep abreast of the activities of CCI, IPCC, the United Nations Framework Convention on Climate Change (UNFCCC) and other climate-related bodies, report results of meetings and workshops, and encourage strong regional involvement in these bodies;
- To provide advice on methods to strengthen and improve climate system monitoring, analyses and indices;
- Provide advice to the WG-CLS on the above issues.

Within these Terms Of Reference, the Task Team will seek to collaborate and align with regional meteorological communications work done in other relevant forums having a common objective.

### **TASK TEAM ON USE OF IMPROVED TOOLS FOR OPERATIONAL AGROMETEOROLOGY INCLUDING COPING WITH IMPACT OF NATURAL DISASTER ON AGRICULTURE (TT-ITA)**

The Terms of Reference of the Task Team are:

- To analyze and evaluate the use of crop simulation models in the NMHSs and institutions in RA V and suggest the procedures to implement them;
- To review the studies on agro climatic and agro ecological zonation that make use of GIS and Agro meteorological Information Systems in RA V and determine the best procedures for their implementation throughout the Region;
- To evaluate and propose appropriate methodologies for the application of remote sensing in agriculture in the Region.
- To review and evaluate the operational use of seasonal to inter-annual climate forecasts sustainable agriculture in South West Pacific and make recommendations to improve the presentation of the forecasts for the users;
- To review reports of climate change scenarios for RA V and catalogue the various agricultural impacts associated with such scenarios;
- To investigate the drought indices that are commonly used in RA V to evaluate the relation between these indices and the spatial impacts in the agricultural activity;
- To liaise with the relevant Commission for Agricultural Meteorology (CAgM) Expert Teams and Task Teams as appropriate.

Within these Terms Of Reference, the Task Team will seek to collaborate and align with regional meteorological communications work done in other relevant forums having a common objective.

## **TASK Team ON AGRO METEOROLOGICAL INFORMATION for Enhancing Farming Productivity (TT-AIF)**

The Terms of Reference of the Task Team are:

- Enhancement of the communication channels for the improved dissemination of agricultural meteorological information;
- Strengthening information and dissemination networks;
- To evaluate the different ways of diffusion of agro meteorological information for the different users, obtain feedback from the users and to propose appropriate mechanisms to improve it;
- To liaise with the relevant Commission for Agricultural Meteorology (CAgM) Expert Teams and Task Teams as appropriate.

Within these Terms Of Reference, the Task Team will seek to collaborate and align with regional meteorological communications work done in other relevant forums having a common objective.

## **WMO RA-V WORKING GROUP ON INFRASTRUCTURE (WG-INFR)**

- (a) To monitor, promote and develop strategies for the Regional development and sustainable implementation of the WMO Information System (WIS), including the steps described in the WIS Implementation Plan for Regional Association V (South-West Pacific). A high priority remains overcoming the persistent shortcomings of the Regional Meteorological Telecommunication Network for time-critical and operation critical data exchange. Avenues include Pacific-wide satellite communications, collaboration in the development and support of the RAdio and InterNET (RANET) communication system, reception of the Emergency Managers Weather Information Network, and improved access to Internet services;
- (b) To monitor, promote and develop integrated strategies for the Regional development and sustainable implementation of the observing systems of WMO Programmes and co-sponsored Programmes, in particular through the WIGOS Implementation Plan for Regional Association V (South-West Pacific). Specific areas of focus are tabulated in that plan;
- (c) To promote and facilitate the compliance of WIGOS and WIS Technical Regulations and Manuals;
- (d) To review and propose updates for the Regional WIGOS Implementation Plan;
- (e) To identify means for strengthening liaison with bodies involved in the development and implementation of relevant observing and information systems;
- (f) To identify education and training requirements for relevant information and communication techniques and observing systems and operations; RESOLUTIONS 149
- (g) To provide input for WMO regulatory material related to observations and information systems, in particular ensuring National Focal Points effective participation in Fast Track procedures approved under Res 21 (Cg-17);
- (h) To coordinate task teams to complete specific tasks and submit proposals to the RA

- V Management Group for winding up completed teams and starting new teams;
- (i) To report to and advise the president and Management Group of the Association on the above issues;

### **TASK TEAM ON WIGOS INTERPRETATION AND OPPORTUNITIES (TT-WIGOS)**

The Terms of Reference of the Task Team are to:

- Provide information and advice to Members and the RA V Management Group about the WIGOS concept, the implementation strategy, and the implications and requirements for actions at the Regional level;
- Identify opportunities and priorities for Regional action;
- Consult widely in order to formulate proposal/s for WIGOS Demonstration Project/s, with an emphasis on activities that are sustainable and may be generalized for adoption across the entire Region;
- Contribute to the development of WIGOS Regional Centres.
- Facilitate the preparation of National WIGOS Implementation Plans (N-WIP)
- Promote and facilitate the use of OSCAR/Surface by Members of the Region
- Provide advice to WG-INFR on the above issues.

### **TASK TEAM ON PACIFIC OBSERVATIONS QUALITY MANAGEMENT WITH BROADER SCOPE (TT-OQM)**

The Terms of Reference of the Task Team are:

- Identify quality management processes in RA V member countries;
- Facilitate the sharing of expertise in quality management processes;
- Promote access to observations data quality reports to members;
- Contribute to the regional implementation of the WIGOS Data Quality Monitoring System, in particular the Incident Management procedures for the observing networks of the Region• Provide advice to WG-INFR on the above issues.
- Provide advice to WG-INFR on the above issues.

### **TASK TEAM ON Aircraft Based Observations (TT-ABO)**

The Terms of Reference of the Task Team are:

- In collaboration with Regional members and the CBS ET-ABO, develop a regional implementation plan for aircraft-based observations and AMDAR as a component of the Regional WIGOS Implementation Plan.
- Collaborate with regional airlines and national ATMs on the establishment of programs to deliver aircraft-based observations on the WMO GTS.
- Assist designated regional centers in the process of developing and maintaining quality monitoring systems for ABO.
- Undertake and assist in technical training, workshops, promotion and outreach on

ABO, targeting both regional Members and the ATI.

- Consult with data users and applications areas to determine and promote regional requirements for ABO.
- Provide advice to WG-INFR on the above issues.

### **TASK TEAM ON REGIONAL IMPLEMENTATION AND OPERATION OF WIS (TT-WIS)**

The Terms of Reference of the Task Team are to:

- Establish a regional implementation strategy for WIS/DAR services;
- Provide information and advice to Members about the WIS Implementation Plan and its implications and application in the Region;
- Provide guidance documentation on how to implement the new functionality of WIS, especially metadata;
- Provide advice on the designation process and promote the early action by NMHSs to have their own centres designated;
- Promote the establishment of GISC, DCPC and National Centres in the Region;
- Seek early pilots to demonstrate the operation of GISC, DCPCs and NCs, including a demonstration of WIS capability in a SIDS National Centre and a non-NMHS centre;
- Liaise with the WIS Project Office and relevant Expert Teams of the CBS OPAG-ISS;
- Provide advice to WG-INFR on the above issues.

### **TASK TEAM ON SATELLITE UTILISATION (TT-SU)**

The Terms of Reference of the Task Team are:

- To identify the priority needs of countries in RA V to obtain and exchange meteorological satellite data and related information;
- To include communications needs both within-country and regional/global needs;
- To identify and examine existing communications solutions and their shortcomings;
- To include communications needs both within-country and regional/global needs;
- To investigate options and alternatives and make recommendations on effective and achievable means to overcome the shortcomings;
- To make recommendations on capacity building initiatives to enable sustained operation and maintenance of satellite data receiving, processing and visualization systems, with particular regard to the new generation of meteorological satellites;
- Provide advice to WG-INFR on the above issues.

Within these Terms Of Reference, the Task Team will seek to collaborate and align with relevant work done in RA II, and related work done in other relevant forums having a common objective, including the RANET - Pacific Communications Steering Committee, SPREP and PI-GCOS.

**REGIONAL ASSOCIATION V TROPICAL CYCLONE COMMITTEE FOR THE SOUTH PACIFIC AND SOUTH-EAST INDIAN OCEAN (TCC)**

- (a) To promote and coordinate the planning and implementation of measures for the improvement of cyclone warning systems and related meteorological services and the facilitation of efforts to minimize loss of life, human suffering and damage caused by RESOLUTIONS 143 tropical cyclones and related natural hazardous phenomena in the tropical part of Region V south of the equator;
- (b) To review regularly the status of tropical cyclone warning systems in the RA V Tropical Cyclone Committee area and recommend measures for the development or improvement of these systems;
- (c) To review regularly the Tropical Cyclone Operational Plan for the South-Pacific and South-East Indian Ocean and recommend any amendments to the text of the Plan to the president of RA V for approval;
- (d) To coordinate its work with other activities carried out within the WMO Tropical Cyclone Programme, in particular, with the Regional Association I Tropical Cyclone Committee for the South-West Indian Ocean and the Economic and Social Commission for Asia and the Pacific/WMO Typhoon Committee;
- (e) To coordinate its activities with other RA V working groups and rapporteurs;
- (f) To develop, update and facilitate the implementation of the Technical Plan of the RA V Tropical Cyclone Committee;
- (g) To seek, through RA V, financial and technical support for the programme activities;
- (h) To promote and coordinate the planning and implementation of measures for the establishment of the Storm Surge Watch Scheme in the Region in collaboration with the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology;
- (i) To establish task teams as it finds necessary to carry out the work of the Committee, noting the decisions of RA V with respect to the creation of the Task Team on Severe Weather Forecasting including Global Data-processing and Forecasting System and the Task Team on Coastal Inundation including Storm Surges;

**Task Team on Severe Weather Forecasting including Global Data Processing and Forecasting System (TT-SWFD/DPFS)**

The Terms of Reference of the Task Team are to:

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**Task Team on Coastal Inundation including Storm Surges (TT-CISS)**

The Terms of Reference of the Task Team are to:

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## RA V OPERATING PLAN 2016–2019

## 1. RA V Operating Plan 2016-2019 : WXS

ER	KO	KPI	DELIVERABLE / ACTIVITY
1	1.1	1.1.1	<p><b>Enhanced timely and accurate weather forecast / warning for aviation.</b></p> <ul style="list-style-type: none"> <li>Regional events to raise awareness of and improve understanding of ICAO-WMO requirements among NMHSs and various agents of aviation sectors in the Pacific region on aviation meteorological services</li> <li>Assist to develop national and inter-agency formal agreements for aviation weather services among NMHSs, Fiji Meteorological Services / RSMC-Nadi and other NMHSs in the Pacific Islands</li> <li>Support/promote projects for Installing equipment including hardware and software for verification of TAF in NMHSs of Pacific Islands (Fiji, Papua New Guinea, and Vanuatu).</li> <li>Assist in resolving Asia/Pacific deficiencies as identified by ICAO in the area of SIGMET, especially in the Pacific Islands (Cook Islands, Kiribati, Nauru, Solomon, Islands, and Tonga)</li> <li>Assist to harmonize or align legislations or equivalents of NMHSs and Civil Aviation Authorities or equivalents to meet ICAO-WMO requirements</li> </ul>
1	1.1	1.1.1	<p><b>Implemented QMS for aviation meteorological service providers</b></p> <ul style="list-style-type: none"> <li>QMS guidance (WMO webpage &amp; forum, input into WMO/ICAO publications and COMET module)</li> <li>'Twinning' or mentoring Members on QMS processes and audits.</li> <li>Assist Pacific Islands Meteorological Authorities, NMHS and Civil Aviation Authorities to enhance QMS for aviation meteorological services.</li> </ul>
1	1.1	1.1.1	<p><b>Implemented cost recovery for aviation meteorological service providers</b></p> <ul style="list-style-type: none"> <li>Conduct a survey on cost recovery for aviation meteorological services in RA V Members.</li> <li>Develop and provide guidance on cost recovery for aviation meteorological services.</li> </ul>
1	1.1	1.1.1	<p><b>Implemented competency assessment for aviation meteorological service providers</b></p> <ul style="list-style-type: none"> <li>Conduct a survey to determine current status of the implementation of competency assessment for AMO and AMF in RA V Members.</li> <li>Develop and provide guidance to assist Members in RA V to implement competency assessment for AMO and AMF.</li> </ul>



1	1.1	1.1.2	<p><b>Improved coordination of weather services in the Region.</b></p> <ul style="list-style-type: none"> <li>• Organize session of RA V WG/WXS.</li> </ul>
2	2.1	2.1.1	<p><b>Improved communities and other stakeholders safety</b></p> <ul style="list-style-type: none"> <li>• Engage with stakeholders to develop new products.</li> <li>• Completion of verification spread sheets by NHMs and in-country progress reports for SWFDDP.</li> <li>• Discussions between NMHSs and local communities to help them to improve understanding of early warnings for disaster related to weather.</li> <li>• Develop weather related hazard/disaster response plans for local communities and economic sectors.</li> </ul>
6	6.3	6.3.2	<p><b>Met the AMO and AMF requirements in all existing and new aviation weather observers</b></p> <ul style="list-style-type: none"> <li>• Assist Pacific Island Countries NMHSs to conduct competency assessment for AMO and AMF.</li> </ul>
7	6.3	6.3.1	<p><b>Provided training by national / regional institutions and improved capacity of NMHSs in communicating weather information including warnings to the communities.</b></p> <ul style="list-style-type: none"> <li>• WMO Southern Hemisphere Training Workshop on public weather services.</li> <li>• Training in communication.</li> <li>• Training in media presentations (interview and writing articles)</li> </ul>

## 2. RA V Operating Plan 2016-2019: CLS

ER	KO	KPI	DELIVERABLE / ACTIVITY
1	1.2	1.2.1	<p><b>Enhanced provision of agrometeorological services to the user community</b></p> <ul style="list-style-type: none"> <li>Review the various dissemination methods of agro meteorological information to agricultural users.</li> <li>Evaluate these dissemination methods and propose appropriate mechanisms to improve them especially in developing and least developed countries.</li> </ul>
1	1.2	1.2.2	<p><b>Improved tools for operational agrometeorology in face of climate variability and climate change</b></p> <ul style="list-style-type: none"> <li>Review the operational use of seasonal to inter-annual climate forecasts sustainable agriculture in South West Pacific and make recommendations to improve the presentation of the forecasts for the users.</li> <li>Review the drought indices commonly used in RA V and evaluate their impacts on agricultural production.</li> </ul>
3	3.2	3.2.1	<p><b>Improved regional coordination mechanism and climate services, and established platform(s) for coordination of climate services in Region V.</b></p> <ul style="list-style-type: none"> <li>Organize session of RA V WG/CLS and Pacific Regional Climate Outlook Forum (RCOF).</li> <li>Organize annual (3rd, 4th, 5th and 6th) meetings of the Pacific Island Climate Services (PICS) Panel.</li> <li>Set up regional and national registration for climate services projects, programs and activities including review the structure, maintenance and use of SPREP regional database and report to WG/CLS and Pacific Meteorological Organization (PMC).</li> <li>Draft RA V RCC-Network implementation plan for the Pacific Islands and establish Regional Climate Centers (RCCs) in Region V.</li> <li>Develop strategies for climate services to reflect the implementation of GFCS at the national, local communities, and sectors' levels.</li> </ul>
4	4.4	4.4.1	<p><b>Preserved historical climatological data</b></p> <ul style="list-style-type: none"> <li>Complete digitization of paper records of climatological data in Pacific Islands.</li> </ul>
4	4.4	4.4.2	<p><b>Maintained climate database</b></p> <ul style="list-style-type: none"> <li>Provide training in the management and maintenance the climate database.</li> </ul>
5	5.3	5.3.2	<p><b>Strengthened global GAW stations and regional / contributing GAW stations.</b></p> <ul style="list-style-type: none"> <li>Organize GAW data to also contribute to GFCS.</li> <li>Maintain and enhancement of 1 global GAW stations and 2 regional GAW stations</li> </ul>

5	5.3	5.3.2	<p><b>Improved sharing of information air quality in Region V.</b></p> <ul style="list-style-type: none"> <li>• Support training and capacity building activities related to atmospheric chemistry</li> <li>• Enhance GAW activities.</li> <li>• Organize technical exchange and cooperation on atmospheric composition observation</li> </ul>
5	5.4	5.4.1	<p><b>Enhanced accuracy (temporal and spatial) of forecasts and warnings.</b></p> <ul style="list-style-type: none"> <li>• Conduct studies on monsoons and their interactions with ENSO, IOD and MJO.</li> </ul>
6	6.3	6.3.1	<p><b>Provided training by national / regional institution and improved capacity of NMHSs in climate services.</b></p> <ul style="list-style-type: none"> <li>• Review international standards of qualification and competency for climate services production and delivery and potential adaptation of them for the Pacific region.</li> </ul>
6	6.3	6.3.2	<p><b>Increased number of climatologists in Pacific Island Countries</b></p> <ul style="list-style-type: none"> <li>• Support 3 to 4 staff from Pacific Island Countries NMHSs per year to the post-graduate diploma in climatology at the relevant institutions</li> </ul>

### 3. RA V Operating Plan 2016-2019: HYS

ER	KO	KPI	DELIVERABLE / ACTIVITY
2	2.2	2.2.1	<p><b>Improved flood forecasting systems and techniques</b></p> <ul style="list-style-type: none"> <li>• Implementation of FFGS and/or other appropriate tools such as coupling Himawari8 in Region V.</li> <li>• Provision of reports and web portal information on regional applications; IFAS, TopNet, IFFRM, Delft-FEWS etc.</li> <li>• Propose strengthened, or establishment of, early warning systems for floods in Members of RA V.</li> </ul>
2	2.2	2.2.1	<p><b>Improved linkages with DRR community and other stakeholders.</b></p> <ul style="list-style-type: none"> <li>• Promote development of hydrological products for inputs to end-to-end multi-disaster warning systems - Pac-HYCOS2, CIFDP.</li> <li>• Promote regular discussions between NMSs and NHSs through a community of practice web portal.</li> <li>• Strengthen or develop national joint programmes between NMSs, NHSs and NDMOs on public awareness and education on floods that is inclusive of women, girls, youth, children, disabled people, and vulnerable communities.</li> </ul>
2	2.2	2.2.1	<p><b>Achieved benefits for the water sector through the implementation of GFCS</b></p> <ul style="list-style-type: none"> <li>• Develop and help implement implement water sector products (climate outlooks, EHP material, workshops, etc) as part of GFCS and IDMP.</li> <li>• Review and report on appropriate database systems for small countries/agencies.</li> </ul>

5	5.4	5.4.1	<b>Improved drought monitoring and management capabilities.</b> <ul style="list-style-type: none"> <li>Assist in development of seasonal prediction products for water management purposes.</li> </ul>
6	6.1	6.1.2	<b>Reinforced communication platform for hydrological services in the region</b> <ul style="list-style-type: none"> <li>Develop concept note for Pac-HYCOS2, SEA-HYCOS and promote. Communicate via web portal and IWRM platforms.</li> </ul>
6	6.3	6.3.2	<b>Increased number of hydrologist in Pacific Island Countries</b> <ul style="list-style-type: none"> <li>Support staff from Pacific Island Countries NHSs to post-graduate degrees in hydrology and courses based on QMF and WMO no. 1003.</li> </ul>

#### 4. RA V Operating Plan 2016-2019: INFR

ER	KO	KPI	DELIVERABLE / ACTIVITY
4	4.1	4.1.1	<b>Stations metadata provided to WMO regularly.</b> <ul style="list-style-type: none"> <li>Publicize and/or develop communication strategy or MoU or equivalents to enhance and enable NMHSs to have access and to utilize facilities and expertise in Regional Instrument Centres to calibrate meteorological instrument</li> <li>Enhance the capacity of Members in RA V to achieve traceability.</li> <li>Monitor and detect discrepancies between current performance and the metadata lodged with WMO.</li> <li>Implement new WIGOS metadata standards in Members of RA V.</li> </ul>
4	4.1	4.1.1	<b>implemented WIGOS across Region V.</b> <ul style="list-style-type: none"> <li>Develop national WIGOS implementation plans.</li> <li>Organize regional workshops for managers of weather and climate observations to discuss WIGOS.</li> <li>Assess and provide profiles of national observing systems and networks against WIGOS requirements / standards</li> </ul>
4	4.1	4.1.2	<b>Members in the Pacific subregion received data from new generation of geostationary meteorological satellites such as Japan's Himawari-8</b> <ul style="list-style-type: none"> <li>Assist Members in the Pacific subregion to receive data from the new generation of geostationary meteorological satellites such as Japan's Himawari-8.</li> <li>Document RA V user requirements and priorities for satellite data and products</li> <li>Document regional satellite requirements using CBS / Space programme guidelines.</li> </ul>
4	4.1	4.1.2	<b>Increased availability of aircraft-based (AMDAR) observations in Region V.</b> <ul style="list-style-type: none"> <li>Develop, complete and implement Aircraft-Based Observations Implementation Plan for RA-V within the perspective of GANP.</li> <li>Discuss with Pacific national and regional airlines participate</li> </ul>

			in AMDAR observations programme.
4	4.1	4.1.2	<p><b>Consolidated the implementation of basic networks (RBSN and RBCN including GSN and GUAN)</b></p> <ul style="list-style-type: none"> <li>• Regularly review monitoring reports and bring to the attention of Member countries.</li> <li>• Restore silent RBSN stations.</li> <li>• Access to and to be able to utilize ocean surface wind vector data, and satellite radar altimetry (wave height) data.</li> <li>• Restore silent RBCN stations and GUAN stations.</li> </ul>
4	4.2	4.2.1	<p><b>Implemented WIS across Region V.</b></p> <ul style="list-style-type: none"> <li>• Develop national WIS implementation plans or equivalents for Members of RA V based on ASBU's road map, WIS RAV Implementation Road Map</li> <li>• Implement RA V WIS implementation plan.</li> <li>• Organize regional workshops on WIS.</li> </ul>
4	4.2	4.2.1	<p><b>Enhanced capability and capacity of Members in the Pacific to understand and meet their communication needs and to participate in the international exchange of data</b></p> <ul style="list-style-type: none"> <li>• Implement RAV WIGOS implementation plan.</li> <li>• Provide training and support in WIS and other communication systems to Members of RA V.</li> <li>• Provide information and advice to Member countries on communication options</li> <li>• Implement WIS in Pacific Islands' NMHSs.</li> </ul>
4	4.2	4.2.2	<p><b>Improved data processing and forecasting system in Pacific Islands' NMHSs</b></p> <ul style="list-style-type: none"> <li>• Install data processing and forecasting systems which are compliant with WIS in Pacific Islands' NMHSs.</li> </ul>
4	4.3	4.3.1	<p><b>Operationalized 70 % of GCOS stations network in Region V</b></p> <ul style="list-style-type: none"> <li>• Develop regional GCOS implementation plan.</li> <li>• Implement GCOS implementation plan.</li> </ul>
6	6.2	6.2.1	<p><b>Improved regional coordination of infrastructure of NMHSs.</b></p> <ul style="list-style-type: none"> <li>• Organize session of RA V WG/INFR.</li> </ul>
6	6.2	6.2.1	<p><b>Prepared catalogue of available of technology in use in the Region.</b></p> <ul style="list-style-type: none"> <li>• Use existing survey of instrumentation.</li> </ul>
6	6.3	6.3.2	<p><b>Met the BIP-MT requirements / standards in all existing weather and climate observers in Pacific Island Countries NMHSs</b></p> <ul style="list-style-type: none"> <li>• Support Pacific Islands NMHSs to ensure that all their existing and new weather and climate observers meet BIP-MT requirements.</li> </ul>

## 5. RA V Operating Plan 2016-2019: TCC

ER	KO	KPI	DELIVERABLE / ACTIVITY
1	1.1	1.1.2	<p><b>Enhanced wave modelling and NWP products including access to the information.</b></p> <ul style="list-style-type: none"> <li>• Enhance wave modelling capability, including 3 wave models with wind inputs from NCEP-GFS and NAVGEM (now running operationally).</li> <li>• Install equipment including hardware and software in, and/or make available tools, techniques and information to, NMHSs in Pacific Islands to predict wave heights.</li> <li>• Install equipment including hardware and software in, and/or make available tools, techniques and information to, NMHSs in Pacific Islands to predict storm surges.</li> <li>• NMHSs of RA V TCC accessing available and utilizing tools, techniques and information to predict wave heights.</li> </ul>
1	1.1	1.1.2	<p><b>Strengthened ferry operators / inter-islands boat operators, port authorities and enforcement agencies obtain marine forecasts.</b></p> <ul style="list-style-type: none"> <li>• Provide forecasts for marine activities</li> <li>• Client summary at least once a year</li> <li>• Strengthen relationships between NMHSs and relevant marine agencies through developing agreements or equivalents with port authorities</li> <li>• Develop and conduct public awareness and education in the Pacific Islands for inter-island boats operators and small crafts operators on the use and interpretation of marine weather information and forecasts.</li> <li>• Installation of marine weather and climate observations equipment on ferries / inter-island shippings / boats.</li> </ul>
2	2.1	2.1.1	<p><b>Improved coordination of of tropical cyclone warnings in Region V.</b></p> <ul style="list-style-type: none"> <li>• Organize session of RA V TCC.</li> <li>• Coordinate and provide financial support to NMHSs in RA V TCC to participate in the International Workshops on Tropical Cyclones (IWTC).</li> </ul>
6	6.1	6.1.2	<p><b>Improved accessibility and capability to national tropical cyclone warnings in RA V.</b></p> <ul style="list-style-type: none"> <li>• Assist Pacific Island Countries NMHSs to make, transmit, communicate, and back-up system for national tropical cyclone warnings to national and local disaster management agencies.</li> </ul>
6	6.3	6.3.1	<p><b>Provided training for NMHSs in RA V TCC in tropical cyclone forecasting.</b></p> <ul style="list-style-type: none"> <li>• Organize the WMO Southern Hemisphere Training Courses on Tropical Cyclones.</li> <li>• Provide training, and update and implement the tropical cyclone module for NMHSs of RA V TCC.</li> <li>• Organize participants from Pacific NMHSs to participate in attachment training at RSMC Nadi -TCC. at RSMC Honolulu.</li> <li>• Develop and implement competencies assessment for tropical cyclone forecasters in NMHSs of RA V TCC.</li> </ul>

6	6.3	6.3.1	<b>Provided training for NMHSs in RA V TCC in satellite meteorology</b> <ul style="list-style-type: none"><li>• Organize training at WMO-CGMS Virtual Lab for Education and Training in Satellite Meteorology (centre of excellence, supported by BoM and JMA).</li></ul>
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## RA V REGIONAL ACTIVITIES (2016-2019)

<b>Regional Events</b> \ <b>Years</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Session of the Association		December* (RA V-17)		
Regional Conference on the Management of Meteorological and Hydrological Services (RECO)		December* (RECO-7)		
Session of the Management Group (MG)	17 June Geneva (MG-14)	May Geneva (MG-15)  September (MG-16)	June Geneva (MG-17)	May Geneva (MG-18)
Working Group Chairs' Meeting				April/May Singapore
Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean (TCC)	29 August-2 September Honiara, Solomon Islands (TCC-16) in conjunction with SWFDP RSMT (24-26 August)		March/April (TCC-17)	
Working Group on Hydrological Services (WG-HYS)			February/March	
Working Group on Climate Services (WG-CLS)	2-4 February Singapore (WG-CLS)*			February/March
Working Group on Weather Services (WG-WXS)	September/November			
Working Group on Infrastructure (WG-INFR)		March/April		
SPREP/WMO		20-23 August Solomon Islands (PMC-4)  24 August Solomon Islands (PMMM-2)		

\* RA V-17 and RECO-7 are will be scheduled in April/May 2018



**EC-68 AGENDA ITEM 10.3: IMPLEMENTATION OF THE SMALL ISLAND DEVELOPING STATES (SIDS) AND MEMBER ISLAND TERRITORIES (MITs) PROGRAMME**



World Meteorological Organization

EXECUTIVE COUNCIL

Sixty-Eighth Session

Geneva, 15 to 24 June 2016

EC-68/Doc. 10.3

Submitted by:  
Secretary-General

13.V.2016

**DRAFT 1**

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**AGENDA ITEM 10: CAPACITY DEVELOPMENT**

**AGENDA ITEM 10.3: IMPLEMENTATION OF THE SMALL ISLAND DEVELOPING STATES (SIDS) AND MEMBER ISLAND TERRITORIES (MITs) PROGRAMME**

**SIDS-MITs PROGRAMME**

**SUMMARY**

**DECISIONS/ACTIONS REQUIRED:**

Adopt draft Decision [10.3/1](#) — *Advisory Group for the WMO SIDS-MITs Programme.*

**CONTENT OF DOCUMENT:**

The Table of Contents is available only electronically as a Document Map\*.

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\* On a PC, in MS Word 2010 go to "View" and tick the "Navigation Pane" checkbox in the "Show" section. In MS Word 2007 or 2003, go to "View" > "Document Map". On a Mac, go to "View" > "Navigation Pane" and select "Document Map" in the drop-down list on the left.

**DRAFT DECISION**  
**Draft Decision 10.3/1 (EC-68)**

**ADVISORY GROUP FOR THE WMO SIDS-MITs PROGRAMME**

THE EXECUTIVE COUNCIL,

**Recalls** Resolution 54 (Cg-17) which established the Programme for WMO Small Island Developing States and Member Island Territories (SIDS-MITs) with long-term objectives to:

- (1) Strengthen the capabilities of WMO Members to meet the needs of their governments and communities through the provision of comprehensive weather, climate and water and related environmental services with particular emphasis on public safety and welfare;
- (2) Support the NMHSs of the SIDS-MITs to enhance their capabilities to participate and contribute actively to priority areas such as agriculture, food security and rural development, disaster risk reduction, health, water resources management and climate change adaptation and mitigation;

**Acknowledges** the special vulnerability of SIDS as recognized by the global community in the SIDS Action Platform - the S.A.M.O.A Pathway, the Istanbul Programme of Action for the LDCs (2011–2020), Agenda 2030 (SDGs), the Sendai Framework for DRR, the Paris Agreement on Climate Change and the Global Framework for Climate Services;

**Having considered** the report of the Ad Hoc Advisory Group Meeting on WMO Programme for SIDS–MITs (Geneva, 11-12 April 2016) including the proposal priorities for the SIDS-MITs Programme for this financial period,

**Recognizes** the need to specify activities under the Programme during the financial period giving attention to the fact that there is no core budget allocation to the Programme;

**Observes** that this further elaboration would benefit from the ongoing advice from Members and in particular SIDS & MITs representatives;

**Agrees** with the priorities identified by the Ad Hoc Advisory Group;

**Requests** the Secretary-General, regional associations, technical commissions and Members to support these priorities and pursue innovative approaches for implementation of priority actions in the seventeenth financial period (2016-2019);

**Welcomes** the proposal by the Ad Hoc Advisory Group Meeting for the Secretary-General to convene an Advisory Group for the SIDS-MITs Programme including inter-regional representation of Permanent Representatives from WMO Small Island Developing States and Member Island Territories to provide advice on the further elaboration of the Programme;

**Requests** the Secretary-General to support the deliberations of the Advisory Group for the SIDS-MITs Programme in the seventeenth financial period (2016-2019).

**BACKGROUND INFORMATION SUPPORTING DECISION**  
**NOT TO BE INCLUDED IN THE SESSION REPORT**

**WMO PROGRAMME FOR SMALL ISLAND DEVELOPING STATES AND  
MEMBER ISLAND TERRITORIES**

**REPORT OF THE AD HOC ADVISORY GROUP MEETING**

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WMO SECRETARIAT GENEVA

APRIL 11-12 2016

**1. Background**

There are 51 Small Island Developing States (SIDS) globally which, in spite of their geographical and cultural diversity, share similar socioeconomic challenges such as a narrow resource base, remoteness from markets, limited ability to benefit from economies of scale and small but rapidly growing population. SIDS are particularly exposed to natural hazards of geological and hydrometeorological origin including earthquakes, volcanic eruptions, tsunamis, cyclones, river and coastal flooding, landslides, and droughts. Additionally, they are feeling the effect of sea-level rise and ocean acidification, among others, due to the impacts of climate change. In recent years, a significant number of high-impact weather and climate events have inflicted catastrophic property damage and loss of human life. Although natural disasters also occur in non-island countries, the impact of a natural disaster on a SIDS is expected to be relatively larger in terms of damage per unit of area and cost per capita due to the small size of the country. Their particular socioeconomic and climate characteristics make SIDS some of the most vulnerable countries in the world to climate change.

The special challenges faced by SIDS were recognized at the Rio+20 Conference, and further emphasized during the United Nations 3rd International Conference on SIDS in Samoa in September 2014. The Heads of States and Governments committed to supporting the efforts of SIDS to build resilience to the impacts of climate change and to improve their adaptive capacity through the design and implementation of climate change adaptation measures appropriate to their respective vulnerabilities. The SAMOA Pathway highlights the importance of providing technical assistance and financing for risk assessment, early warning systems, disaster preparedness, post-disaster response and recovery as well as establishing and strengthening disaster risk insurance facilities.

**2. WMO Programme for SIDS and Member Island Territories (MITs)**

Sustainable climate and weather early warning systems are among the most cost-efficient interventions to support climate change adaptation. Establishing tailored weather and climate services, and especially sustainable early warning services in SIDS and MITs, will help to reduce communities' vulnerability and increase their adaptive capacity to climate variability and change. However, SIDS and MITs face to varying degrees capacity shortfalls to meet the increasing demands and liabilities related to the provision of weather and climate products and services. There is an imperative need to assist them to build greater institutional, operational and technical capacities to improve their capacity to cope with current and future climate variability, especially weather and climate change related hazards.

Resolution 54 (Cg-17) established in 2015, the Programme for WMO SIDS and MITs as an integral part of the WMO Development and Regional Activities (DRA) Department. This Programme will focus on enhancing NMHSs' capability to address hydrometeorological challenges with a vision of helping governments and communities make informed decisions on safety and a wide array of socioeconomic development sectors. The overall objectives of the Programme for WMO SIDS and MITs as stated in Resolution 54 (Cg-17) are:

- (a) Improving delivery of weather and climate information services;
- (b) Strengthening human and technical capacities at national and regional climate centers;
- (c) Increasing range of products and services delivery to stakeholders;
- (d) Fostering South-South / North-South cooperation;
- (e) Expand infrastructure required for weather and climate research and services.

### 3. Outcomes of the Ad Hoc Advisory Group Meeting

Key outcomes of the meeting included:

- Enhanced understanding of the global context and priorities within which WMO Programme for SIDS/MITs including the role and contribution of WMO in achieving such priorities;
- Identification of current national and regional challenges and gaps in NMHSs' of SIDS/MITs capacity to meet their mandates;
- Articulation of priority action areas based on identified gaps and challenges of NMHSs in addressing the specific needs of SIDS/MITs; and
- Identification of organizational arrangements to help operationalize the Programme.

### 4. National and regional capacity gaps

- National governance systems: there is a need for a better understanding and strengthening of the structure of national government systems related to weather and climate services including policy and legal frameworks as well as institutional arrangements. NMHSs need support to engage effectively on governance issues;
- Strategic planning in NMHSs: NMHSs need support to develop strategic frameworks that address SIDS specific weather- and climate-related challenges and priorities while ensuring alignment with their national mandate, national policy priorities, WMO Strategic Plan as well as relevant global priorities;
- Human resources capacity: Retention of capacity within NMHSs in SIDS remains a challenge. Training a critical mass of people may help to address it. Training should focus on leadership and management of NMHSs and also on new areas specific to SIDS;
- Operational capacities:
  - Infrastructure and IT systems need improvement including observation, monitoring and transmission systems and numerical capabilities;
  - Prediction capabilities of NMHSs should be enhanced for marine forecasting, flash flooding and storms;
  - NMHSs capacity should be strengthen for impact-based forecasting: Due to space constraints, most of the economic and social assets of SIDS are located in hazards prone areas. NMHSs need a better knowledge and understanding of risk and should be enabled to provide impact-based forecasting products and services;
- Service delivery and feedback mechanisms: Strengthen the production of user relevant weather and climate information/services and improve the dissemination channels. In this

regard, NMHSs need to establish partnerships including with NGOs to ensure effective delivery of weather and climate services/information to communities/”Last Mile”;

- Research capacity: SIDS have specific technological needs. Therefore NMHSs need to engage or to support Research Programmes that address SIDS specific needs;
- Resource mobilization: NMHSs need support to engage in collaboration with financing institutions such as Multilateral Development Banks. Cooperation among SIDS should also be enhanced in this regard;
- Sustainability of investments: NMHSs need to ensure post implementation sustainability of investments. This is critical to secure returns expected of these investments.

The meeting also highlighted the following issues which WMO should consider to engage in to sustain its work at country level:

- Recognition of WMO and NMHSs contribution in achieving the global development agenda in SIDS: There is a need for a clear recognition of NMHSs contribution in the achievement of global development priorities. SDGs indicators do not translate easily into hydrometeorology services. As a consequence, NMHSs contribution is not well reflected and recognized through the monitoring process. WMO should engage in political lobbying and support the creation of technical expertise to clarify the contribution of hydrometeorological services to SDGs and relevant global priorities;
- Alignment of NMHSs planning with national strategic frameworks: WMO should engage more in existing coordination mechanisms at country and global level. At country level, the UN Development Assistance Framework (UNDAF) allows to define the UN system’s collective response to national development priorities, and as such, is a mechanism through which WMO could ensure consistency of NMHSs plans with UN and national development priorities and plans;
- Climate funding vs weather funding: Climate change has overlooked discussions over weather. This has led to a gradual decrease in the availability of funding for weather-related activities. There is a need to draw the donors attention on the need for more balanced interventions and therefore increased funding for weather related programmes or activities.

## 5. Implementation priorities for WMO SIDS and MITs Programme

### Short-term priorities:

- Strengthen national governance frameworks: This work includes support to engagement of NMHSs in the establishment of national policy and legal frameworks conducive to increased public awareness and support to hydrometeorological services, increased political will and resources as well as clear allocation of responsibilities. Short-term priority in this area consists of undertaking an analysis of national (and regional) governance systems with regard to the policy and legal frameworks, institutional arrangements and the role and recognition of NMHSs for the provision of weather and climate services;
- Support strategic planning in NMHSs: Conduct needs assessment to identify priority countries that need support for Plan development. Assist in strategic planning taking into account country opportunities and priorities, while ensuring compliance with WMO standards;
- Enhance NMHSs operational and technical capacity for marine forecasting and flash flooding. With regard to flash flooding, the short-term priority focuses on reviewing the applicability of the WMO FFGS to SIDS specific needs;

- Strengthen NMHSs operational and technical capacities for impact-based forecasting: Strengthen the capabilities of NMHSs to understand their specific risks as well as the requirements and needs for impact-based forecasting. Provide support to identify the type and source of needed information as well as required operational and technical capacities for impact-based forecasting;
- Support communication/outreach/advocacy: NMHSs need to re-introduce themselves to the community and communicate on the added-value of NMHSs and forecasts for social and economic development. The short-term priority will consist in supporting the development of a communication strategy for hydrometeorological services including NMHSs engagement with the media for weather forecasting and identification of key players that could advocate for hydrometeorological services;
- Propose an Advisory Group on SIDS-MITs.

Medium-term priorities:

- Strengthen national governance frameworks: On the basis of the assessment, develop an approach to support the engagement of NMHSs in the establishment of national policy and legal frameworks conducive to increased public awareness and support to hydrometeorological services, increased political will and resources and clear allocation of responsibilities;
- Implement a Flash Flood Guidance System (FFGS) that addresses the specific needs of SIDS;
- Strengthen NMHSs capacities for impact-based forecasting: Strengthen the operational and technical capabilities of NMHSs to produce and deliver impact-based forecasts;
- Enhance prediction capabilities for marine forecasting;
- Support the establishment of coordination and cooperation mechanisms among SIDS at regional level (SIDS task teams): In particular, to develop SIDS coordination mechanisms within RA I and RA IV that are similar to mechanisms in RA V;
- Strengthen human resources capacity: Develop and implement a training approach for SIDS based on training needs for NMHSs staff, training programmes provided by other partners and opportunities for peer-to-peer exchange of expertise;
- Support communication/outreach/advocacy: Strengthen advocacy work in NMHSs and advocate the added value of forecasts and other meteorological and hydrological services for social and economic development through supporting the implementation of the communication strategy;
- Support resource mobilization efforts in NMHSs.

Long-term priorities:

- Continue to strengthen national governance frameworks;
- Support communication/outreach/advocacy work;
- Initiate discussions aimed at strengthening research programmes to address SIDS specific technological needs.

## 6. SIDS-MITs Advisory Group

It is proposed that a SIDS-MITs Advisory Group be created within the WMO structure to help operationalize the WMO Programme for SIDS.

### Main functions of the SIDS-MITs Advisory Group:

- Elevate the SIDS agenda within WMO community;
- Monitor the development and implementation of the programme to ensure contribution to the implementation of the SAMOA Pathway priority areas;
- Ensure that NMHSs of WMO SIDS and MITs can contribute effectively to sustainable development programmes within their countries including through genuine and durable partnerships.

### Membership:

PRs from SIDS and MITs

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Annex: 1

## Annex: Priority action areas for WMO Programme for SIDS and MITs

Priority action areas	Implementation priorities		
	Short-term priorities	Medium-term priorities	Long-term priorities
<p><b>National governance systems related to weather and climate services</b></p> <ul style="list-style-type: none"> <li>▪ Strengthen policy and legal frameworks;</li> <li>▪ Improve institutional arrangements.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conduct analysis of governance systems related to weather, water and climate services: policy, legal and institutional frameworks, including analysis of the role and recognition of NMHSs for the provision of weather and climate services.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Develop an approach to support the engagement of NMHSs in the establishment of national policy and legal frameworks conducive to increased public awareness, political will and resources for weather and climate activities and clear allocation of responsibilities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Strengthen national governance frameworks related to weather and climate services.</li> </ul>
<p><b>Strategic planning in NMHSs</b></p> <ul style="list-style-type: none"> <li>▪ Develop strategic frameworks for NMHSs operations.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conduct needs assessment to identify priority countries that need support for strategic planning;</li> <li>▪ Support the development of strategic plans based on country opportunities and priorities related to water and climate services.</li> </ul>		
<p><b>Operational and technical capacities of NMHSs</b></p> <ul style="list-style-type: none"> <li>▪ Improve Infrastructure and IT systems (observation, monitoring and transmission networks and numerical capabilities);</li> <li>▪ Enhance prediction capabilities for marine forecasting, Flash Flooding and storms;</li> <li>▪ Strengthen capabilities for</li> </ul>	<ul style="list-style-type: none"> <li>▪ Flash Flooding: Review the applicability of the WMO FFGS to SIDS specific needs;</li> <li>▪ Impact-based forecasting: Assess the operational and technical requirements for impact-based forecasting in specific countries as well as NMHSs capacities needs; Identify type and source of information required for impact based-forecasting.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Implement a FFGS that addresses the specific needs of SIDS;</li> <li>▪ Strengthen operational and technical capabilities to produce and deliver impact-based forecasts;</li> <li>▪ Enhance prediction capabilities for marine forecasting.</li> </ul>	



impact-based forecasting.			
<b>Human resources capacity</b> <ul style="list-style-type: none"> <li>▪ Training for a critical mass of people;</li> <li>▪ Focus on leadership and management of NMHSs;</li> <li>▪ Focus on areas specific to SIDS.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Develop and implement a training approach for SIDS.</li> </ul>	
<b>Service delivery and feedback mechanisms</b> <ul style="list-style-type: none"> <li>▪ Strengthen the production of user targeted products/ services;</li> <li>▪ Improve dissemination channels.</li> </ul>		<ul style="list-style-type: none"> <li>▪ Develop/strengthen partnerships including with NGOs and community organizations to ensure effective delivery of weather and climate services/ information to communities/"Last Mile".</li> </ul>	
<b>Research capacity</b> <ul style="list-style-type: none"> <li>▪ Strengthen research programmes to address SIDS specific technological needs.</li> </ul>			<ul style="list-style-type: none"> <li>▪ Initiate discussions aimed at strengthening research programmes to address SIDS specific technological needs.</li> </ul>
<b>Resource mobilization</b> <ul style="list-style-type: none"> <li>▪ Strengthen collaboration with financing institutions;</li> <li>▪ Enhance SIDS/SIDS Cooperation.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Initiate discussions on resource mobilization during the strategic planning process.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Support resource mobilization efforts in NMHSs.</li> </ul>	
<b>Sustainability of investments</b> <ul style="list-style-type: none"> <li>▪ Improve post implementation sustainability of investments.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Initiate discussions on the approach to sustainability of investments during the strategic planning process.</li> </ul>		
<b>Visibility of NMHSs</b> <ul style="list-style-type: none"> <li>▪ Communicate on the added value of NMHSs and forecasts for social and economic development.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Support the development of a communication strategy for hydro-meteorological services including NMHSs engagement with the media for weather forecasting;</li> </ul>	<ul style="list-style-type: none"> <li>▪ Support the implementation of the communication strategy.</li> </ul>	

	<ul style="list-style-type: none"> <li>▪ Identify key players that could advocate for hydro-meteorological services.</li> </ul>		
<b>Regional cooperation</b>	<ul style="list-style-type: none"> <li>▪ Establish a SIDS Advisory Group on SIDS and develop the terms of reference by June.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Support the establishment of coordination and cooperation mechanisms among SIDS at regional level.</li> </ul>	

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