

WORLD METEOROLOGICAL ORGANIZATION

**EXECUTIVE COUNCIL
PANEL OF EXPERTS ON EDUCATION AND TRAINING**

TWENTY-THIRD SESSION

SAN JOSE, COSTA RICA

17-21 MARCH 2008

FINAL REPORT WITH RECOMMENDATIONS



Executive Summary

The twenty third session of the WMO Executive Council Panel of Experts on Education and Training was held in Costa Rica from 17 to 21 March 2008. This was the first meeting of the new Panel selected by EC-LIX and it was the first EC Panel meeting run under the Results Based Framework.

During this session the Panel focused on four key areas:

- Reviewing the Education and Training Programme component of the Secretariat Operating Plan for input into the WMO Operating Plan;
- Qualifications of personnel involved in supplying meteorological products and services to air navigation;
- Reconfirmation processes and recommendations for WMO Regional Training Centres; and,
- Issues related to the running of the Education and Training Programme by the Education and Training Office.

WMO Operating Plan (agenda 3)

The Panel reviewed the Education and Training Programme components of the Secretariat Operating Plan for adaptation to the WMO Operating Plan. It was noted that many of the current Key Performance Targets were better described as activities and the Panel developed alternative Key Performance Targets for the current Deliverables. In addition to developing new Key Performance Targets it was also noted that three new Deliverables should be considered for the WMO Operating Plan and an additional Performance Indicator relating to the ETRP was required for Expected Result 7 in the next WMO Strategic Plan. The Panel noted that the wording for the Deliverables, Key Performance Targets and Indicators will all need to evolve as more quantitative or SMART (Specific, Measurable, Achievable, Realistic and Time bound) Targets and Indicators are developed over time.

Qualifications of personnel providing meteorological services to air navigation (agenda 4.4)

Regarding the qualifications of Aeronautical Forecasters and Observers the Panel considered processes and time lines to assist Members have their personnel certified to provide meteorological services for air navigation. The Panel noted that it was not practical or desirable to change the underlying thrust of the fourth edition of WMO publication 258 and retrospectively remove the requirement that WMO Meteorologists hold an appropriate degree (or equivalent qualification) in meteorology or an appropriate science and mathematics degree and have successfully completed a condensed basic instruction package (meteorology) course. With this starting point the Panel noted the following time lines:

- Aviation Forecasters trained prior to 1 January 2005 don't need to have a degree to be independent forecasters but they do need to be able to demonstrate that they meet the requirements outlined in Supplement 1 to WMO-No. 258.
- Aviation forecasters trained after 31 December 2004 must have an appropriate degree (or equivalent) as well as meet the requirements laid down in Supplement 1 to WMO-No. 258.
- In late 2010, ICAO will mandate that Air Navigation Service Providers (ANSP) must have implemented an ISO approved Quality Management Framework.

Given these time lines the Panel recommended the following actions:

- Revision and strengthening of Supplement 1 to WMO-No. 258 into a standalone "Guide" or minimum set of standards that must be met. This would include developing an instruction and assessment "kit", to complement the Guide that could be used by Members.
- Advising ICAO that non-degreed forecasters trained after 31 December 2004 and prior to 1 January 2011 be allowed to continue operating as independent aviation forecasters provided they are pursuing appropriate undergraduate studies that will allow them to graduate with the appropriate qualification prior to 31 December 2014 AND they can demonstrate that they meet the requirements outlined in Supplement 1 to WMO-No. 258.

To assist in the implementation of these two actions the Panel formed two Expert Teams, the first one to revise and strengthen Supplement 1 to 258 and develop the instruction and assessment "kit". The Convenor for this team is Mr Ian Lisk from the UK Meteorological Office. The second team to be convened by Dr Vilma Castro from the University of Costa Rica is to investigate options for delivery of an accredited online undergraduate degree that could be taken by Members whilst continuing to work as aviation forecasters. The team will initially pilot the project for RA III and RA IV Members and then extend it to other regions as suitable providers are identified.

In addition the Panel noted the discussions in some Regions for Members to form regionally based Aviation Forecasting Centres to provide meteorological services for air navigation to a range of Members. Noting that in this situation, staff from one Member would be providing services to one or more other Members consideration of training and fellowship requests to support these initiatives should take into account the potential for these activities to benefit the Members in that region.

Reconfirmation of WMO Regional Training Centres (agenda 7.6)

Regarding the reconfirmation of WMO Regional Training Centres the Panel reviewed the processes and procedures for the external assessment and recognition of WMO Regional Training Centres to improve the responsiveness of reporting to EC (a change to the Panel's internal processes to allow external assessment reports to be considered intersessionally and a recommendation to EC that the EC Criteria be amended to allow the President of a Regional Association to nominate a new WMO-RTC outside of a full Session of the Regional Association). The format of the external assessor reports was also considered with the Panel noting the desirability of the assessment recommendations being split into recommendations of a preventative nature and, recommendations of a corrective nature when it is clear that the EC Criteria are not being met. The Panel further recommended that the WMO-Regional Training Centres of Angola, Brazil, Iran and Israel be reconfirmed provided the recommendations in the external assessment reports are implemented.

ETRP issues (agenda 7)

In relation to a range of management issues within the Education and Training Programme the Panel:

- noted that EC-LX will decide on filling the two vacant Panel positions;
- noted that the Training Needs Analysis of Members Training needs is incomplete and needs to be further developed using input from the Training-Management-Team as well as input from regional associations and technical commissions;
- recommended a process to utilize any additional funds the ETRP is successful in obtaining from the surplus for the fourteenth financial period;
- requested the Secretary-General to ensure that no further courses are advertised through the Secretariat using the old classification system;
- suggested the theme for the next WMO Education and Training Symposium (SYMET-XI) be "*New Approaches to the education and training of meteorological and hydrological forecasters*". The Panel further noted that in order for any recommendations or views from the Symposium to be included in planning for ETRP activities in the sixteenth financial period it would be necessary to hold it before the end of March 2010 with the next Panel session to be after the Symposium but before EC-LXII.

In closing the meeting the Panel Chair congratulated the Panel on their enthusiastic, interactive and valuable work completed during the session.



Figure 1. Members of the Twenty-third Session of the Executive Council Panel of Experts on Education and Training

Back row: (L - R) I. Draghici, C. Garcia-Legaz, K. Johnson, G.V. Necco, I. Lisk, C. Webster

Middle row: (L - R) M. Wang, K.-J. Park, C. Billard, T. Spangler, V. Castro

Front row: (L – R) N. Alegre, J. Wilson, P. Manso, A.I. Bedritsky, I. Al-Atwi

Insert: Mr J. Wellens Mensah. and Prof A. Salcedo

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Annex 1: Revised Agenda

Annex 2: List of Participants

Annex 3: Proposed ETRP Deliverables and Key Performance Targets for the WMO Operating Plan

Annex 4: Information on ETR Requirements from CAeM interactions with ICAO

Annex 5: Submission on South Pacific Island Education and Training Issues

Annex 6: EC Criteria for the Recognition of WMO RTCs (EC-LVIII, June 2006 reviewed version)

Annex 7: Summary Reports from RTC external assessments

Annex 8: RTC Review Programme – Review process and Self-assessment

Annex 9: WMO-RTC Self-assessment Questionnaire

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. ORGANISATION OF THE SESSION

1.1 OPENING OF THE SESSION

1.1.1 The twenty-third session of the Executive Council Panel of Experts on Education and Training (PAN-XXIII) was held in Costa Rica from 17 to 21 March 2008. In the opening of the session, Dr A.I. Bedritsky, the President of WMO and Chairman of the Panel thanked Mr P. Manso, Permanent Representative of Costa Rica with WMO for agreeing to host this session and for the excellent local arrangements and assistance from the staff of the Instituto Meteorológico Nacional (IMN), WMO Office for North America, Central America and the Caribbean and Regional Training Centre.

1.1.2 As this was the first meeting of this Panel since Congress XV he greeted the returning Panel members and welcomed the new Panel members and the three invited participants (list of participants for this session - Annex 2). He noted the passing away of Mr Rafael Cubero who assisted Dr Carlos Garcia-Legaz (Spain) with interpretation for Panel sessions over many years and asked Dr Garcia-Legaz to pass on the condolences of the Panel to his family.

1.1.3 The Chairman noted that the agenda for this session was significantly different to previous sessions. This change reflected one aspect of the movement of the WMO Secretariat to a Results-Based Management framework focused on outcomes rather than the underlying Programme structures. He noted that a significant number of the previous reports would still be covered. The presentation of the reports is one way the EC Panel monitors and guides the progress of the WMO Education and Training Programme (ETRP) and evaluates whether it is meeting its targets.

1.1.4 The Chairman recalled that the WMO Education and Training Programme is made up of multiple segments, activities provided through the WMO Regional Training Centres, activities provided through WMO Members themselves (either through their National Meteorological or Hydrological Services or other entities such as universities or even private companies) and activities facilitated through the WMO Secretariat, usually with the assistance of one or more Member countries.

1.1.5 To assist the Panel in planning, implementing, monitoring and evaluating their work the Chairman reminded the Panel that they would be working within the new WMO Results-Based Management framework.

1.1.6 The Chairman recalled that the subject of accreditation and certification of personnel involved in the support of aeronautical meteorological services had previously been discussed by this Panel and led to the development of a supplement to the WMO 258 Publication "Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology". This supplement provides guidance to Members on how they could go about certifying that their staff meet the competencies outlined for aeronautical meteorologists in WMO 258. Many Members have indicated that they anticipate having difficulties meeting these requirements when ICAO introduce their mandatory ISO based quality management system ruling in late 2010, or soon afterwards. He noted that WMO Members will be looking to the Commission for Aeronautical Meteorology (CAeM) for guidance and assistance in this matter but, because lack of education and training are a large part of the problem, CAeM are also looking to this Panel for assistance. This issue will impact on all WMO Members but most likely have the largest impact on those Members from the Small Island Developing States (SIDS) who are almost totally reliant on international air transport and the Least Developed Countries (LDCs). He noted that there is no easy solution to this problem and that the Panel is expected to show leadership and innovation in suggesting workable solutions to this component of the problem.

1.1.7 In addressing the wide range of problems and opportunities facing the Meteorological and Hydrological education and training community there is a small opening for the Panel to recommend one or more new high priority activity areas to the Executive Council for consideration for additional funding over the next four years. These new activities will need to fit with the Results-Based Management framework and would be more appealing for the EC if they were co-funded or co-resourced by other partners.

1.1.8 In closing he re-iterated his thanks to the Government of Costa Rica, through Mr P. Manso for their kind invitation to host this meeting and he noted his anticipation in meeting some of the staff and students of the Regional Training Centre of Costa Rica.

1.1.9 Mr P. Manso in addressing the session reminded the Panel that Education and Training to serve the NMHSs is a challenge today and it has always been so, particularly in developing countries and particularly with the increased interest and concern about climate, climate change and climate adaptation. Problems that must be dealt with, such as low number of candidates or keeping personnel updated with the advances of technology may look different now, but they are the same old ones with a different dress.

1.1.10 Mr Manso reminded the Panel that Costa Rica has the privilege of having a University that has maintained a career in Meteorology, starting at the undergraduate level, for almost 40 years. However, even in Costa Rica, as the Director of the National Meteorological Service, he has a serious problem in finding adequate candidates for hiring because very few people study meteorology, and because the Met Service cannot compete with other employers, public or private, when hiring the few graduates in Meteorology. He advised the Panel that the situation of Costa Rica is sending a message: if a stable country with a 40 year old WMO - RTC and well established meteorological and hydrological service suffers problems finding trained personnel and has problems of a decreasing number of professionals in meteorology in its staff how can other countries without local training at the university level and possibility weaker NMHSs cope. This is one small illustration that we are not addressing the issue of trained personnel in an appropriate way.

1.1.11 He noted that it is a message telling us that we must reconsider the way we have been working in the past 50 years, that we must change perspectives. The Panel as a group of experts within WMO, must know of similar problems existing in different regions of the world. He requested the Panel to please bring his point to the awareness of WMO. He noted that many of the Panel were attending their first session. He wished the Panel a fruitful meeting and that they were enlightened during this Holy Week to be able to look at "old issues with new vision". He finished by reiterating his welcome again to Costa Rica.

1.2 ADOPTION OF THE AGENDA

The provisional agenda was adopted by the session with some amendments, and is reproduced in Annex 1.

1.3 PROGRAMME OF WORK

The Chairman proposed to the Panel that the working hours would be from 08:30 up to 12:30 and from 14:00 up to 17:00, with the usual half-hour coffee breaks at 10:00 and 15:30.

2. MAJOR OUTCOMES OF CONGRESS XV (CG-XV) AND EXECUTIVE COUNCIL (EC-LIX)

2.1 MAJOR OUTCOMES OF CG-XV FOR EDUCATION AND TRAINING

2.1.1 The Panel noted that for the 2008-2011 Financial Period, Congress directed that the Education and Training Programme should place particular attention on the following cross-cutting activities:

- (a) Providing increased assistance to least developed countries (LDCs) in planning and implementing human resources development (HRD) activities in their NMHSs;
- (b) Promoting a greater level of international co-operation in order to exploit more efficiently the wealth of training resources available world-wide, and supporting computer-aided distance learning activities in meteorology and hydrology;
- (c) Providing increased support to training of trainers, HRD planners and managers and encouraging quality education by stimulating national/international accreditation of training institutions and programmes, and professional certification of NMHS personnel;
- (d) Supporting school and popular education in weather, climate and water subjects, and contributing to the increase of public awareness on disaster risk-reduction, prevention and mitigation; supporting education and training for both users and intermediaries.
- (e) Improving curricula for the higher education in meteorology and hydrology to accommodate the new developments in forecasting methods/techniques, various emerging climate change issues, and the new developments in observing system facilities;
- (f) Defining an implementation plan for the new classification of meteorological personnel.

The EC Panel of Experts on Education and Training to define an implementation plan to ensure that all Members are able to implement the changes on a clearly defined timescale. This should be done in liaison with the Commission for Aeronautical Meteorology to ensure that international aeronautical requirements are met.

2.1.2 These activities are to be carried out within the Framework of Results-Based Management.

2.2 MAJOR OUTCOMES OF EC-LIX FOR EDUCATION AND TRAINING

The Panel noted the Terms of Reference provided by the 59th session of the Executive Council (EC-LIX).

2.2.1 Since EC-LIX, two of the original members of the Panel resigned as they have taken up new roles outside of their NMHSs. At the invitation of the Panel Chairman, Mr Christopher Webster (Head of Training, MetService, New Zealand) and Dr Ion Draghici (International Training, National Meteorological Administration, Romania) provided expert input to the session of the Panel and represented Regions V and VI, respectively. The selection of replacement members for the next session of the Panel will be addressed by EC-LX.

2.3 WMO STRATEGIC AND OPERATIONAL PLANS

2.3.1 The Panel was informed of the decision by Cg-XV to change the strategic planning processes used within the organization, in particular the introduction of the new Strategic and Operating Plans for various parts of the Organization and the identification of three Long- Term Objectives (TLO), five Strategic Thrusts (ST) and 11 Expected Result (ER).

2.3.2 The Panel noted the wide range and number of training workshops and seminars approved by Congress and included within the Education and Training Programme. It also noted that the WMO Secretariat Training Management Team (TMT) co-ordinated by the

Education and Training Office provided a mechanism for improving the co-ordination and communication between these groups to channel reports back to the EC Panel. The Panel noted that the next meeting of the TMT is scheduled for April 2008 and supported the need for improved reporting on the training plans and activities from these other groups in a format consistent with Results-Based Management.

3. EXCHANGE OF VIEWS ON THE GOALS AND OBJECTIVES OF THE WMO EDUCATION AND TRAINING PROGRAMME (ETRP)

The Panel indicated support for the Education and Training Programme Deliverables described in the WMO Secretariat Operating Plan. The Panel reinforced the importance of these deliverables, in particular, the first ETRP deliverable, number 121. The Panel stated that this assessment of Members' needs should form the foundation of any priority-setting efforts in the Education and Training Programme.

The Panel also recognized the need for SMART (Specific, Measurable, Achievable, Realistic and Time bound) objectives and targets and the need to refine the key performance targets in order that indicators can be established to demonstrate the success of the Education and Training Programme. As such, the Panel recommended that many of the items, listed as Key Performance Targets be instead listed as activities. The Panel developed new Key Performance Targets against the existing deliverables for inclusion into the WMO Operating Plan. The Panel noted that these targets will be further refined upon the completion of activities relating to the Members needs assessment (Deliverable 121).

The Panel recognized the importance of outreach in WMO and appreciated the efforts of the Education and Training Programme in this area. The Panel noted that Deliverable 126 falls into the Outreach category. The Panel suggested no changes to this Deliverable but noted that performance indicators in this area are very difficult to establish. The Panel recommended that the ETR Office continue to build on current joint efforts, such as the coordinated school and popular education initiative. In addition, the Panel suggested that this Deliverable be further examined by looking at other WMO Programmes or other organizations to identify appropriate targets and meaningful indicators.

The Panel recommended that the modifications to the Education and Training Programme Deliverables and Key Performance Targets developed during this session (Annex 3a) be included in the WMO Operating Plan.

The Panel noted that there is a need to continually update education and training guidelines to keep pace with new science and new technology, including, but not limited to probabilistic forecasting, ensemble prediction systems, applications of NWP in hydrological forecasting, aeronautical meteorology and climate monitoring and prediction. In addition, the Panel strongly endorsed the need to promote new approaches; in particular, the need to expand the use of distance learning technologies.

The Panel recommends that for the next version of the WMO Strategic Plan (2012 – 2015) additional performance indicators should be developed to reflect the input of the Education and Training Programme to the Expected Result 7.

The Panel recommended three additional deliverables, relating to the Education and Training Programme, be considered for inclusion in the WMO Operating Plan in 2009. As with the current Education and Training Programme Deliverables and Key Performance Targets, details of these Deliverables will follow from the needs assessment of Members, particularly those members from least Developed Countries. It is anticipated that the new science/technology and the aeronautical forecaster training priorities would be most critical for these LDCs. Once a cohesive training needs analysis baseline is established it will be necessary to further review the Key Performance Indicators (Strategic Plan) and Key Performance Targets (Operational Plan) to ensure they meet the SMART objectives criteria.

The Panel recommended that these three Deliverables, along with related Key Performance Targets and Activities be taken into account during the development of the WMO Operating Plan (last three Deliverables in Annex 3b).

4. IDENTIFICATION OF WMO HUMAN RESOURCE DEVELOPMENT REQUIREMENTS

Whilst recognizing that the information provided under this agenda item was incomplete the Panel noted that it was never the less a first attempt at trying to provide a consolidated picture of the WMO Education and Training Needs as required under Expected Result 7 (Sequence Number 121 of the Secretariat Operating Plan). The Panel validated this approach and encouraged the Secretariat and Panel Members to refine the approach and further develop the training needs analysis during the intersessional period of the Panel. Without a cohesive overview of WMO Training Requirements it is very difficult to efficiently prioritize tasks and assign resources in the most effective manner for the Organization.

4.1 WMO ETR SURVEY 2006 ON MEMBERS' TRAINING NEEDS, SPECIAL HRD NEEDS OF LDCs

4.1.1 The sixth survey of Member's training needs, opportunities and capabilities of Member States was carried out during 2006. The questionnaire was sent to all Members and requested information on:

- The current status of national education and training in meteorology and operational hydrology
- Their human resources development - assessment;
- Assessment of WMO training activities;
- Their future education and training requirements, opportunities and capabilities;
- The current status of accreditation and certification in meteorological education and training in their country, focusing on aeronautical meteorological personnel; and,
- The extent to which their NMHS has public education and outreach programmes or activities.

4.1.2 More than one-third of LDCs have never responded to the WMO ETR Survey since it commenced in 1994, including two Members who have WMO-RTCs located in their countries. The Panel encouraged the ETR Office to use all available means (such as visits of opportunity, discussions with appropriate personnel, reports from other Secretariat staff or Panel members) to seek information from the LDCs and Members with RTCs who did not respond to the 2006 Survey. The highest return rates were from Regions II, III and VI, and the lowest were from Regions I, IV and V.

Region/No. of Members	% Returned	Region/No. of Members	% Returned
I – (52)	48	IV – (22)	27
II – (34)	56	V – (19)	47
III – (12)	58	VI – (50)	60

Return rates for each Region. Members in more than one Regional Association are only shown in one Region.

4.1.3 In general the quality of responses was good, however, as in previous surveys caution must be used when analyzing the data and drawing conclusions. See WMO Survey 2006 (WMO/TD-No. 1380) for full details of the survey results.

4.1.4 Overall the number of Member countries reporting periodic continuing education and training (CET) programmes has increased from 26% in 2002 to 62% in 2006 with more than 70% of respondents using ICT in their CET programmes.

4.1.5 The Panel noted with appreciation that the survey indicates an increased number of personnel were trained by Members during the fourteenth financial period. It also provides an indication of regional training requirements and capabilities in various fields of meteorology and operational hydrology. To meet the training needs identified by Members and to use available capabilities effectively it will be necessary to intensify the cooperation and coordination of education and training activities within and between regions.

4.2 INFORMATION ON ETR NEEDS FROM OTHER SECRETARIAT TECHNICAL DEPARTMENTS

4.2.1 The Panel noted that many of the other WMO Programmes routinely survey WMO Members on issues related to their Programme. In many cases these surveys include questions related to the Education and Training Needs of Members for that Programme however it has not been common practise for the data on these training needs to be provided to the ETR Office (except as part of formal publications or reports). The Panel recommends that the ETR Office actively pursue additional information on Members Education and Training Needs from other Secretariat groups, regional associations and technical commissions. The opportunity should be taken to develop a common format or framework in the proposed country profile database for the training needs questions of all questionnaires coming from the Secretariat, Regional Associations or Technical Commissions. Establishment, and widespread use, of such a framework would provide consistency between surveys (in time and across groups) and should, over time, build up a much more complete picture of WMO Training Needs.

4.2.2 The Panel also noted other training needs not necessarily covered in the 2006 Questionnaire or in questionnaires from other departments. These training needs relate to: traditional personal development areas such as written and oral presentation, communication skills, dealing with media etc; more service focused needs of assisting NMHSs develop staff skilled in better identifying their client groups and working with them to improve the quality and utilization of existing products as well as increase the range of products available; and, assisting NMHS staff develop skills in communicating and demonstrating the positive impacts that their services have on the national economies.

4.2.3 The Panel encouraged the ETR Office to use the Training Management Team meeting in April 2008 to further identify, clarify and collect the training needs of the other WMO Programmes to refine the overall picture of the WMO Education and Training Needs.

4.3 INFORMATION ON ETR NEEDS FROM FELLOWSHIPS REQUESTS

4.3.1 Since 1 January 2004 the Panel noted that all WMO Fellowship requests have been entered into the Fellman Plus database. The highest number of requests for fellowships in 2007 was received from Region I (Africa), followed by Region II (Asia), see table below. A similar pattern was observed in previous years. This could be due to the combination of several factors: the total number of WMO Member countries in these two Regions; the level of development of their NMHSs, and; the economic conditions of these Member countries, most of which are categorized as least developed countries (LDCs). The following tables depict the demand and awarding of fellowships over the last four years (based on the starting date of the fellowship request). These tables only count fellows starting in each year.

	2004		2005		2006		2007		Total Awards
	Requests	Awarded	Requests	Awarded	Requests	Awarded	Requests	Awarded	
I	64	61	33	26	80	34	90	28	149
II	20	20	14	14	32	25	45	39	98
III	16	16	14	14	10	8	10	7	45
IV	14	14	13	11	13	11	11	6	42
V	5	5	6	4	4		12	8	17
VI	8	8	6	5	8	3	4	3	19
	127	124	88	74	147	81	172	91	370

Number of fellowship requests and awards for the last four years by region

	2004	2005	2006	2007	Total
Long-term	51	23	31	29	134
Short-Term	20	34	21	36	111
Very Short	53	17	29	26	125
	124	74	81	91	370

Awarded fellows by length of study

	I		II		III		IV		V		VI	
	Request	Award	Request	Award	Request	Award	Request	Award	Request	Award	Request	Award
Aeronautical Met.	2											
AgroMeteorology	25	11									1	1
Applied Met.	5	4			1	1						
Atmospheric and Env. Sci	3	1									1	
Climatology	5											
Computing and Communications	10	1	4	2			2					
Hydrology	11	3	3	2	2	1	5	5				
Management	7		8	3			1	1	1	1		
Meteorology	61	51	19	19	4	4	10	9	2		3	2
Meteorological Forecasting	66	13	4	3	3	3	6	5	6	5		
Meteorological Observations and Instruments	3	3	2	1			2	1				
Numerical Modelling	3	3	1	1	1		2	2				
Oceanography	2											
Others	23	9	5	2	3	2						
Satellite Meteorology	1	1										

Number of requests and awards for fellowships by subject and Region since 2004

4.3.2 The Panel noted the continuing work within the ETR Office regarding improved quality control of the data in the Fellman Plus database. Until this work is complete the above tables can only be treated as indicative, not quantitative.

4.4 INFORMATION ON ETR REQUIREMENTS FROM CAEM INTERACTIONS WITH ICAO

4.4.1 The Panel noted that the implementation of the two tier classification has caused difficulties for air navigation meteorological service providers in many countries. The 2006

WMO ETR survey and other information suggest that many WMO Members (in particular those in the developing countries and the Least Developed Countries) will have difficulty demonstrating that their Aeronautical Meteorological Forecasters (AMF) meet the International Civil Aviation Organization (ICAO) personnel classification requirements as described in WMO-No.258 and its Supplement No.1 (aeronautical personnel, hereon referred to as 'the Supplement'). Many training establishments in RA I, II and III are still running 'old' WMO Class-II forecaster training programmes whilst in other parts of the world e.g. the South Pacific Islands, there are insufficient resources to recruit and adequately train WMO Meteorologist forecasters (see New Zealand submission on South Pacific Island Education and Training Issues at Annex 5). The Panel was also informed that with effect from 2010 there will be a mandatory ICAO requirement for all Air Navigation Service Providers (ANSP) to have implemented an approved ISO based Quality Management System. A more detailed analysis of the issues together with the associated training needs and priorities can be found at Annex 4.

4.4.2 The Panel considered options that would assist members in ensuring that AMF staff will in future comply with AMF training and qualification requirements.

4.4.3 The Panel agreed that in order to advise on the urgency and assist members in demonstrating compliance it would be necessary to raise awareness of the provisions made in WMO-No.258 and the Supplement by contacting Permanent Representatives, RTCs, Regional Associations and Education and Training Focal Points.

4.4.4 Whilst noting that the meaning of "Guidelines and Guides" varies within WMO, the Panel recommended that the status of the Supplement #1 to WMO-258 be 'strengthened' from 'WMO Guidelines' (implying advisory or suggested minimum standards) to a **standalone** 'WMO Guide' (meaning mandatory or compulsory minimum standards) to reflect the need for mandatory compliance of air navigation meteorological service providers with aeronautical regulatory bodies' standards. The Panel also recommended that, based on recent experience and feedback from Members, the opportunity should also be taken to further clarify and provide additional guidance on some of the text contained within the Supplement and WMO-No.258.

4.4.5 The Panel proposed that in order to assist members in assuring the compliance of their former Class-II AMF in post before 1st January 2005 that a WMO-ETR Technical Document describing suggested tools, study materials, resources and examples should be produced which a member could then use to ensure that their AMF satisfy the requirements as listed in the Supplement.

4.4.6 The Panel was informed of the 'drivers' relating to the WMO-No.258 compliance of AMFs:

- A significant number of national air navigation meteorological service providers are continuing to utilise un-supervised non-degreed AMF staff qualified post 31st December 2004;
- Immediate enforcement of the requirements would have a direct negative impact on the ability of Members to provide aeronautical services as stipulated by ICAO;
- The ICAO requirement for all ANSPs to have implemented an approved ISO based Quality Management System in 2010;
- Successful completion of a typical degree course takes between three and four years;
- ETR will task an Expert Team to investigate opportunities and options for undergraduate degree blended or distance learning courses in Meteorology

4.4.7 In response to these 'drivers' the Panel proposed the following:

- Non-degree AMFs qualified between 1st January 2005 and 31st December 2010 who comply with the requirements described in the Supplement can operate as independent forecasters but only if these staff are working towards a relevant degree and are also declared and registered with their respective national Meteorological Authority. If these staff do not subsequently obtain a degree by 31st December 2014, they must revert to operating only as a supervised AMF until such time as they acquire the full degree.
- All aeronautical forecasters qualified post 31st December 2010 must, in addition to complying with the requirements as described in the Supplement, obtain a relevant degree before being qualified to operate as an independent AMF i.e. as described in WMO-No.258 Fourth Edition.

4.4.8 In order to aid the full implementation of WMO-No.258 the Panel recommended that opportunities for the development of meteorology degree courses by distance learning should be explored and that consultation on this matter should take place with RTCs, Regional Associations and regional universities.

4.4.9 The Panel also noted that only those WMO Regional Training Centers that offer a degree programme, either by residence or distance learning, or by a combination of both can graduate meteorologists. Regional Training Centers that develop distance learning programs, should be encouraged to share those programmes with other RTCs.

4.4.10 The Panel noted that some small NMHSs were investigating the option of forming regional forecast centers as one way of providing aeronautical forecast services due to the lack of sufficient numbers of suitably qualified staff in each individual NMHS. The Panel recommended that priority be given to fellowship and other training requests from these Members where it can be demonstrated that this activity will benefit all Members in that area.

4.4.11 The Panel suggested that two expert teams, should be established in order to address the various implementation issues raised during this session. The first expert team would address issues related to the transition of the current Supplement to a "Guide" whilst the second would investigate the options and opportunities for undergraduate blended or distance learning courses in Meteorology. The Panel requested that both expert teams should consider the role of continuous professional development in any subsequent recommendations. The Panel nominated Mr Ian Lisk (UK Met Office) to convene the first Expert Team and Dr Vilma Castro (WMO-RTC Costa Rica) to convene the second Expert team. The final make-up of the two teams will be decided by the two convenors in conjunction with the Panel Chair and advice from the ETR Office. Noting the absence of any approved funding to support the two Teams the Panel requested the two convenors to use email and internet audio to start their work. The Panel requested the Secretary General to consider use of some of the surplus funds to fully fund the two Expert Teams (see agenda item 6) for a limited number of meetings and to develop and publish the outcomes of their work.

4.5 INFORMATION FROM ETR FOCAL POINTS / RAPORTEURS ON EDUCATION AND TRAINING

4.5.1 The Panel noted with pleasure the recent input from the ETR National Focal Points regarding updated information on the Education and Training Needs of their Services. The questionnaire was sent to the 85 NFPs who have email addresses. 35 responses were received with the largest number of responses from RA VI. In terms of short-term training needs the two common priority areas were "Weather Forecasting" and "Meteorological Instruments". In terms of long-term training needs the top priority was "Numerical

Prediction/Atmospheric Modelling” (15) with the count of the other topics more uniform, ranging from “Weather Forecasting” (11) to “Radar Meteorology” (7) and “Seasonal Forecasting” (5). These results are broadly in-line with the results from the 2006 Survey and thus support the 2006 results. “Seasonal Forecasting” did not rate so highly on the 2006 Survey, it is not known if the higher ranking in this impromptu survey reflects an increased emphasis or is a factor of sampling error / who responded.

4.5.2 The Panel noted that few reports have been received from the regional rapporteurs on Education and Training matters and asked the ETR Office to contact the presidents of regional associations and the current ETR rapporteurs to remind them of the importance of their input and the need for ETR matters to be considered when the regional associations develop their input for the WMO Operational Plan.

4.6 ACCREDITATION AND CERTIFICATION IN METEOROLOGICAL EDUCATION AND TRAINING

4.6.1 The Panel noted that currently there is no formal global accreditation or certification scheme for meteorologists or operational hydrologists. WMO Publication 258 “Guidelines for the Training of Personnel in Meteorology and Operational Hydrology” provides a common syllabus for education and training institutes globally to base their courses upon, or benchmark their courses against, but there is no group that globally accredits courses or institutions as being compliant with WMO 258 or certifies that individuals meet the WMO 258 requirements. There are some national schemes, such as in the UK that do this via professional associations but this is done on a national not global, basis. The external assessments of the WMO Regional Training Centres generally make some comment on the extent to which the RTC bases its courses on WMO 258 but this should not be seen as an accreditation or certification process.

4.6.2 In the longer term, the Panel noted that once all NMHSs have staff who possess the academic and practical qualifications outlined in WMO 258 it would be possible to use the existing international agreements within the academic community to test the academic qualifications of NMHS staff and to use instruments such as Supplement No.1 to the fourth edition of WMO 258 to test the practical competencies. In the meantime, it will be necessary for Members to use a mixture of means as discussed in Section 4.4 of this report if they are required to show that their staff meets the guidelines outlined in WMO 258.

5. ETRP TRAINING ACTIVITIES

5.1 TRAINING EVENTS ORGANIZED / PLANNED BY WMO

5.1.1 The Panel noted that during 2006 and 2007 WMO supported more than 1200 participants from developing countries to attend over 87 training courses, seminars and workshops. These training events addressed a large spectrum of technical subjects including: weather forecasting, aeronautical meteorology, the use of NWP products, marine meteorology, instruments, automated weather observing systems, satellite and radar meteorology, climate variability and change, climate prediction, agricultural meteorology, hydrology and water resources, drought preparedness, and disaster prevention and mitigation.

5.1.2 Regarding short-term training events aimed at improving the efficiency and effectiveness of the instructional process itself, the Panel noted that particular attention was given to the training of trainers in curriculum development and in the application of modern pedagogical methods and IT tools in training design and delivery. In response to a question from the Panel regarding the background of participants attending the train-the-trainer seminars D/ETR advised the Panel that he was investigating options of running train-the-trainer seminars exclusively for trainers alternating with coaching and mentoring seminars for

those whose main role was not training. Other training events focused on promoting the application of distance learning; updating trainers' science base; human resources development planning; and, promoting school and popular education in meteorology and hydrology.

5.1.3 The Panel strongly supported ongoing work to improve evaluation of education and training programmes within the ETR Office and, through the Training Management Team, the training carried out by the other Technical Departments. The Panel reminded the ETR Office that evaluation should not only cover the end of course evaluation reports but more importantly examine the impact evaluation of the ETR activities.

5.2 TRAINING EVENTS ORGANIZED BY MEMBERS AND CO-SPONSORED BY WMO

5.2.1 During 2006 and 2007 the Panel noted that WMO co-sponsored 80 training courses seminars and workshops organized by Members and attended by more than 1500 participants from other Members, particularly developing countries. Many of these training events were organized in countries hosting WMO-RTCs.

5.2.2 The Panel noted the success of the online High-Profile Training Event (HPTE) on Satellite Meteorology which was held from 16 to 27 October 2006 in which more than 2000 NMHS staff from more than 120 WMO Member countries participated. Of even more importance was the ongoing training and collaboration that came from this event through the regional weather discussions. The best example of this is in RA III and RA IV where multi-lingual sessions are held several times a month that not only provide training but also assist participants in operational decisions. This type of activity can be expanded and used in many areas of education and training and will be an important component of the future ETR strategy.

5.2.3 The Panel was informed of the establishment of the MERCOSUR "Research and Education Centre in Meteorology and related Sciences" (CMM) for Southern America. The major aim of this centre of excellence is "to bring together efforts in promoting research and education and scientific interchange in the MERCOSUR countries to deepen the knowledge of the atmosphere and its interactions with ocean, biosphere and human activities and, thus, support the development of regional policies aiming at mitigating negative impacts and optimizing benefits of climate change and variability the societies and economies of the MERCOSUR countries". The Centre is strongly supported by the educational authorities of the participating countries and is well financed. The Panel suggested RA-III to consider these initiatives in order to take advantage of the potential educational offers that might be available. The Panel noted that similar initiatives were also occurring in other Regions and encouraged Panel members and the Secretariat to inform the relevant Regional Associations of any such opportunities for further the education and training opportunities for WMO Members.

5.3 TRAINING PUBLICATIONS AND RESOURCES

5.3.1 The Panel noted with pleasure the list of publications and resources prepared and distributed by WMO and groups such as COMET to assist WMO-RTCs, NMHS training centers and NMHS staff undertaking self directed study since its last session, these included:

- *Aviation Hazards (developed by experts from the UK Met Office)*, WMO/TD-No. 1390 - ETR-No. 20
- *Members Training Requirements, Opportunities and Capabilities in Meteorology and Hydrology, WMO Survey 2006*, WMO/TD-No. 1380 - ETR-No.19
- *Manual on Policies and Procedures for WMO Fellowships* WMO/TD-No. 1356 - ETR-No.18
- *Training Programmes of WMO Regional Training Centres* WMO-No. 240 (Part V)

- *Guidelines for the education and training of personnel in meteorology and operational hydrology* WMO-No. 258 Vol I and II (*English, Russian, Spanish, French and Arabic*)
- *Guidelines for the education and training of personnel in meteorology and operational hydrology - Training and qualification Requirements for Aeronautical Meteorological Personnel* Supplement No. 1 - WMO-No. 258 (*English, Russian, Spanish, French and Arabic*)
- DVD compilation of COMET Modules distributed to all Members
- The UK Met Office is hosting the MOODLE-based ETR 'Met-Elearning.org' Website and providing support and guidance on the use of the system.
- The ETR Website was updated to facilitate online access to worldwide training resources, as well as exchange of meteorological case studies and related documentation between advanced and less advanced training institutions.
- The Panel noted with appreciation the offer from the Republic of Korea for KMA to host the remainder of the WMO ETRP website at KMA and requested D/ETR to further explore this offer with KMA.
- The Panel was informed that the Royal Meteorological Society has offered to provide each WMO-RTC hardcopy and online access to its four main journals for the next eight years (2008 – 2015). Panel members were encouraged to identify similar opportunities to further assist the WMO-RTCs.

5.4 OPPORTUNITIES AND EXAMPLES OF DISTANCE LEARNING

5.4.1 The Panel noted the outcomes of an Expert Meeting on Computer-Aided Distance Learning in Meteorology and Hydrology (14-16 September 2006, Nanjing) held in conjunction with the Tenth WMO Education and Training Symposium. The experts made a number of recommendations aimed at increasing the learning opportunities and training quality for Members in particular they stressed the need to:

- Develop a website that establishes a WMO community of CAL users in order to share existing contents and experiences;
- Develop "Train the Trainers" courses in blended learning to promote this approach amongst trainers at WMO-RTCs and other training establishments.

5.4.2 WMO-RTC in Venezuela, is offering an online postgraduate course in Hydrology for Spanish speaking Hydrologists. WMO-RTC Costa Rica is offering an MSc in Hydrology since 2005, with the cooperation of professors from the University of Oslo (Norway). Courses are delivered in English they have a strong distance component using resources such as MOODLE, Yahoo messenger and VISIT View. Face to face sessions are reduced to 6 to 8 weeks during a 2 year period. Students are meant to stay in their jobs and do research related to their work so they can work in their thesis as part of their workload. The Panel noted that both of these programmes use blended learning to teach science courses. They are targeting future leaders in NMHSs and their national partner agencies.

5.4.3 The Panel noted with interest that the UK Meteorological Office is currently running a facilitated online management course for 40 mid and senior staff from NMHSs from around the world but especially from LDCs. The aim of this course is *'To improve the understanding and use of management skills and techniques by middle level staff in NMHS's of developing countries, especially the LDC's, with a focus on building projects for development funding'*.

5.4.4 The Panel was advised that the WMO-RTC in St Petersburg is running an International Training Seminar on "The Use of New Teaching Technologies in the Training and Retraining of Hydrometeorological Specialists" in May 2008 for WMO Members from all Regions. The seminar will feature presenters and practitioners from leading developers and users of distance education.

5.5 WMO REGIONAL TRAINING CENTERS (WMO-RTCs)

5.5.1 The Panel were informed that a total number of 4949 local students have been trained at 13 WMO-RTCs during 2005 and 2006. The same WMO-RTCS also trained 622 foreign students out of which 239 were undertaking long-term studies. More than 96% of these students were trained in 8 WMO-RTCs located in RA I, RA II and RA VI.

5.5.2 The Panel noted that many WMO-RTCs reported implementing or intending to implement the new WMO classification of personnel in meteorology and hydrology in line with the recommendations in publication WMO-No. 258, 4thed. 2002. Recalling that the transition period for the implementation of the new classification was extended by EC-LVII to 31 December 2006 it will be important in the next round of external assessments of WMO-RTC's to check on the degree of implementation of the new classification schemes in their course descriptions, syllabus, advertising and teaching resources, see further discussion on this topic in Section 7.6.

5.6 PLANNED USE OF MOODLE AS A COURSE MANAGEMENT TOOL

5.6.1 The Panel was informed that the ETR Office have commenced using the MOODLE course management system as a training management tool in regional training seminars for national trainers and intends to assist other programmes utilize this software in their training activities. The 2008 Train-the-Trainer Seminar held in Venezuela included formal sessions for the lecturers and participants on the use of MOODLE for post course follow-up work and post course evaluation.

5.6.2 The Panel noted with appreciation the assistance of EUMETSAT in providing training on the use of MOODLE in managing training events for one staff member from the ETR Office.

6. ETRP GAP ANALYSIS

6.1 INTRODUCTION

6.1.1 In reviewing the preliminary training needs analysis from Agenda Item 4, the discussion of training activities in Agenda item 5, noting the directions from CG-XV and EC LIX in agenda item 2 and the discussions on the WMO Operating Plan in Agenda item 4 the panel recommended the following methodology for utilizing any additional funds available to the ETRP from surplus funds accrued during 2004 to 2007 financial period.

- Assign 50% of the funds to long term fellowships (6 months or longer) particularly aimed at improving the longer term prospects of LDC Members in the area of hydrology or aeronautical forecasting. Preference should be given to those applications that would have a regional benefit.
- Fully fund the work of the two Expert Teams recommended by the Panel in Section 4.4 of this report and the follow-on publication(s)
- Evenly split the balance of the funds between a combined project aimed at improving the training of aeronautical meteorological forecasters and a range of high priority training activities across the ETRP.

6.1.2 The combined project to develop the capacity of WMO-RTC and NHMS instructors in utilizing distance learning tools and techniques especially for training in aeronautical meteorology areas. The project should also include: targeted support for multi-lingual development or adaptation of aeronautical meteorological training resources and an improvement in the science base of WMO-RTC and NMHS instructors.

7. REPORT ON THE EDUCATION AND TRAINING OFFICE

7.1 IMPLEMENTATION OF THE WMO TRAINING CLASSIFICATION

7.1.1 The Panel recalled that in the fourth edition of WMO Publication 258 "Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology", Volume 1 Meteorology, the previous four tier staff classification was reduced to a two tier classification. The two tiers essentially reflect the grouping of the meteorological observing tasks into one category labeled Meteorological Technicians with the previous Class I mapping into the Meteorologist Class. Many Members use national classification systems that do not directly map into the WMO Classifications and thus are not directly affected by these changes, many other Members have directly mapped from the four tiered classification system into their own national classification systems and are thus directly affected by the change.

7.1.2 The Panel noted that the 2006 ETR Survey showed that less than 50 % of the 95 respondents had completed the transition to the new classification at the time of reporting. A further ten Members indicated their intention to be compliant with the new classification by 1 January 2007.

7.1.3 The Panel was informed that some WMO-RTCs as well as individual Members continued to advertise training opportunities using the previous Class I to IV descriptors. The Panel strongly recommended that no courses framed under the previous classification system should be run within WMO in particular courses should not be advertised as Class II-IV courses.

7.2 INTERACTION WITH COCOM

7.2.1 The Panel was informed that the fifteenth session of COCOM was held in the WMO Headquarters in Geneva in the week of 20 - 24 August 2007. This was the first meeting of the COCOM elected at the Tenth WMO Symposium held in Nanjing China in September 2006 and, the last meeting of the COCOM for Dr I. Draghici as Director of the WMO Education and Training Department.

7.2.2 As part of this session COCOM had discussions with personnel from the WMO Hydrology and Water Resources Department (HWR), Development Cooperation and Regional Activities Department (DCR) and the Aeronautical Meteorology Unit (AEM). These discussions were aimed at identifying opportunities for collaboration and exchange of views on training and training related matters for WMO Members.

7.2.3 Following the discussion with Mr Herbert Puempel, C/AEM during the COCOM session, Dr Spangler from COMET agreed to investigate the feasibility of COMET gathering their aviation related training material together on one DVD in a course format. This resource would complement the existing work by the CAeM Expert Team on Education and Training. Dr Spangler informed the Panel that this work was nearing completion and he anticipated it being made available for review by selected WMO areas by mid 2008. The Panel warmly welcomed this advice and thanked COMET for their continued assistance to all WMO Members.

7.2.4 The Panel noted with appreciation the work of the COCOM in the Computer Aided Learning area through the CALMET Working Group and its very successful conferences. The Panel noted the plans for the next CALMET to be held at the WMO-RTC in St Petersburg in the Russian Federation in June 2009 and asked the ETR Office to seek opportunities to assist staff from WMO-RTCs and LDCs to attend the conference / workshop.

The Panel also noted with appreciation the development of a CALMET Working Group to promote education and training in the utilization of radar in nowcasting.

7.2.5 The Panel encouraged the ETRP to continue the positive and productive working relationship between COCOM and WMO on matters of mutual interest.

7.3 REPORT OF WMO FELLOWSHIPS PROGRAMME

7.3.1 The Panel was reminded that since 2004 the WMO Fellowships Division has been subject to intense scrutiny and review. The changed arrangements for the nomination, selection, monitoring and reporting are detailed in WMO/TD-No.1356 “Manual on Policies and Procedures for WMO Fellowships”. The document and the underlying processes have resulted in a more streamlined and transparent system for the selection and processing of fellowships.

7.3.2 The Panel noted that out of 179 fellows being monitored from 1 January 2004, 42 (23%) are presently in school; 131 (74%) have completed their studies; and 6 (3%) had problems with their studies. Out of the 131 that graduated, 108 graduated in the field of meteorology, 18 in hydrology, 2 in climatology and 3 in environment related subjects. The reports received to date indicate that all the 131 fellows successfully completed their studies (with varying degrees of success), within the anticipated training duration with not more than 1% extension of less than 3 months. Over 11% of the fellows graduated with distinction.

Fellows monitored since 1/1/2004	179
Fellows completed studies	131
Fellows still studying	42
Fellows failed or withdrawn	6

Number of active fellows since 1 Jan 2004

Meteorology	108
Hydrology	18
Climatology	2
Environmental related subjects	3

Number of fellows studying in different domains

7.3.3 The Panel was informed that the return rate of the compulsory fellowship reports was unsatisfactory. The response rates are outlined in the table below. The training institutions have been collaborating positively in the evaluation and monitoring of fellows by reporting on their attendance and academic performance but the reporting rate from the Fellows and their PRs is much poorer. The majority of the reports on completion of studies expressed satisfaction with their institutions and their programmes of study although the level of the stipend continues to be of concern in the Russian Federation and Kenya. The fellows expressed confidence in the knowledge acquired and noted that their studies have prepared them to contribute more effectively to the activities of the national services of their respective countries.

RS- Reports from academic supervisors (Institute)	173
CAT-Confirmation of attendance (Institute)	173
CA - Confirmation of arrival (fellow)	151
RC - Completion of studies report (fellow)	90
RPR – Report on Post –Fellowship activities at 3 months (fellow)	61
R18 – Report on Post-Fellowship activities at 18 months (fellow)	6 out of 49 expected

Numbers of reports from max of 173 Fellows for various stages of the process (see text for details)

7.3.4 The Panel noted that Fellows who studied in Australia, UK, USA and Romania also expressed satisfaction with the training programmes and urged WMO to continue to send fellows to these countries, despite the high cost of training in the UK and USA (although training in the UK and USA are usually provided under UK and USA VCP funding).

7.3.5 The career progression of former fellows is monitored via two main reports viz: post fellowship activities report 3 months after completion of studies (RPR); and a similar one after 18-24 months of completion of studies (R18). Numerous reminders have been sent to the Permanent Representatives of fellows little effect in increasing the response rate. In addition to advising PRs of the need for the activity reports the notifications also recalled the decision of Cg-XV (Geneva 2007) which states that “no further fellowship awards would be considered for the Members until the Permanent Representatives (PRs) provide the required post-fellowship reports, except for those countries that have Trust Fund agreements”.

7.3.6 The aim of the post course reports is: to evaluate the impact of the former fellow and the training programme on the NMHS; and to determine what action, if any would be necessary to further improve the fellowship programmes and processes. Out of 49 fellows due to provide their R18 reports only 6 fellows (representing 4 member-states) have completed the reports. The Member states that have provided reports on behalf of their fellows are Malawi (2 former fellows), Mauritania (2 former fellows), Kenya and Rwanda. The Panel noted with appreciation that, from the reports, all the 6 former fellows have made very positive contributions to the NMHSs of their countries.

7.3.7 The Panel requested D/ETR to continue monitoring the response rate of the various questionnaires and use all possible means to improve the response rate. The Panel also noted that it was essential that the quality of the returned responses be monitored and if necessary changes be made to the underlying forms to ensure that good quality data was obtained for the monitoring and evaluation of the Fellowship Programme.

7.4 TRAINING MANAGEMENT TEAM: CROSS-PROGRAMME CO-ORDINATION

7.4.1 The Panel warmly welcomed the advice that a standing Training Management Team (TMT) for the cross-programme coordination of all WMO-assisted training events was established in the Secretariat in 2007. The main objective of the TMT is to improve the efficiency and effectiveness of the WMO training, through better interdepartmental collaboration and through enhanced partnership with relevant institutions at national, regional and international level.

7.4.2 The Panel noted that improved cross-departmental coordination should give Departments the opportunity to leverage their training programme funds to provide more opportunities for Members than would otherwise be possible. The Panel noted and supported the plans of D/ETR to work closely with the TMT over the next two years to improve the focus and impact of WMO training events.

7.5 TERMET - TERMINOLOGY IN METEOROLOGICAL EDUCATION AND TRAINING

7.5.1 The Panel noted that during the preparation of the fourth edition of WMO 258 significant work was undertaken to prepare a companion glossary document of Education and Training terms. In the end only a small glossary was included in the actual document and a separate document was not produced. The Panel suggested that further work needed to occur in this area to assist with the correct translation and interpretation of documents within WMO and agreed to form an ad-hoc working group led by the Chairman of the Panel to further develop the document. It was noted that the glossary would need to be consistent with the internationally recognized vocabulary of terms.

7.5.2 The Panel also expressed concern that the use of different descriptors for study areas between work from the Training Activities Division and Education and Fellowships Division within the ETR Office and potentially other areas within the Secretariat made it difficult to build up a cohesive picture of the training needs and activities across the organization. The ETR Office was requested to seek a suitable standard taxonomy for use in its databases and use the TMT to encourage widespread use of this in education and training related matters.

7.6 PROGRAMME FOR EXTERNAL ASSESSMENT OF RTCs (PAST AND FUTURE)

7.6.1 The Panel noted the decisions of EC-LVIII (June 2006) in approving an updated Criteria for the Recognition of WMO-RTCs. The updated criteria replace those approved by EC-XXXIV (1982). The Panel noted that under the current EC Criteria regarding proposals for new RTCs it was necessary to wait until the next meeting of the Regional Association before a submission could be considered. This could lead to delays of up to 4 years in some cases if the nomination and the RA meeting schedule were out of sync. The Panel considered options to address this topic as outlined in Annex 6 through intersessional submissions from the President of the RA to EC, see Pan Recommendation 1. The Panel had further lively discussions relating to the issue of RTCs offering academically accredited courses for Meteorologists and Hydrologists. Whilst the Panel agreed with the idea in principle it was noted that the matter would need to be considered at some length to ensure that there were no unexpected consequences from changes to the wording of the EC Criteria, much of the discussion centred around the impact and desirability of adding the word accreditation to the following bullet point from Annex 6, bullet point 2 of (d) "*The education and accreditation level of the various courses of instruction carried out at the Centre should be consistent with the guidance material issued by WMO;.*" The Panel noted the desirability of the external assessors reports classifying their recommendations into two groupings i) recommendations of a preventative nature (ie recommendations that promote compliance with the EC Criteria) and, ii) recommendations of a corrective nature (ie noting that there is obvious non compliance with the EC Criteria and action must be taken to remedy the situation).

RECOMMENDATION ADOPTED BY THE SESSION

Recommendation 1 (PAN XXIII) – EC Criteria for recognition of new and existing WMO-Regional Training Centres

The EC Panel of Experts on Education and Training

Noting:

1. That the EC-LVIII revised the Criteria for the recognition of new WMO Regional Training Centres
2. That the current requirement for decisions relating to the recommendation of new RTCs must be considered by a full meeting of the Regional Association, which can lead to lengthy delays in recommending centres.

Recommends to the Executive Council of WMO:

That the procedure for recommending new RTCs be amended to allow the president of a regional association to forward a recommendation for the creation of a new RTC to EC between sessions of the RA provided all RA members have had adequate time to consider and respond to the nomination. The suggested wording is attached.

The Panel noted that within the last 8 years, all of the WMO Regional Training Centres, with the exception of Iraq, were externally assessed. The assessment process has evolved over this time and now has two parts: a self-assessment using a guide approved by the Panel in Nov 2005; and, a follow on external assessment composed of at least one member of the EC Panel, a member nominated by the PR of the WMO-RTC host country and a member

nominated by the President of the Regional Association, preferably from another RTC. The last of the external assessments in the first review cycle were carried out in 2006 and 2007. These assessments were for the WMO-RTCs in Angola, Brazil and Iran in 2006 and Israel (February 2007). Each of the assessments reports returned a favourable response but they have also noted areas that the relevant WMO-RTC need to improve. A summary table of the observations and recommendations from these assessments is at Annex 7.

After consideration of the reports by the external assessors that positively assessed the RTCs in Angola, Brazil, Iran and Israel the Panel adopted Recommendation 2 (Pan XXIII) Reconfirmation of RTCs assessed during 2006 – 2007. The Panel noted that whilst each of the external assessment reports endorsed the reconfirmation of the RTC status, all reports made strong recommendations regarding improvements that should be made to improve the programmes provided by each RTC. Accordingly, noting the guidance from EC-LVIII requesting that the revised Criteria be strictly applied, the Panel has recommended that the reconfirmation of the RTCs be dependant on them complying with the recommendations in the external assessment reports. The Panel requested the Secretariat to contact each of the RTCs prior to EC-LXI to seek advice on what actions have been taken or are proposed to implement the recommendations of the external assessors. The Panel requested that the Secretariat provide this information to the Panel Chair to allow further intersessional discussion on the status of these RTCs prior to any further recommendation for EC-LXI

RECOMMENDATION ADOPTED BY THE SESSION

Recommendation 2 (PAN XXIII) – Reconfirmation of RTCs assessed during 2006 – 2007

The EC Panel of Experts on Education and Training

Noting:

1. That the external assessment missions undertaken during 2006 and 2007 for the RTCs in Angola, Brazil, Iran and Israel, have shown that the concerned RTCs meet many of the EC Criteria of the Recognition of WMO RTCs
2. That the external assessment reports following the above referred missions recommend the continued recognition of those training Centres as WMO RTCs albeit with recommendations for further improvements in programmes, facilities and curricula
3. That EC-LVIII requested that the revised Criteria for the recognition of existing and new WMO-RTCs be strictly applied.

Recommends to the Executive Council of WMO:

To reconfirm the status of the RTCs of Angola, Brazil, Iran and Israel as WMO recognized Regional Training Centres provided the recommendations in the external assessment reports are implemented.

7.6.2 The Panel recommended that the Guidelines for the external assessment of WMO-RTCs be updated to improve the responsiveness of reporting to EC, bring all of the decisions regarding external assessments into the one document and reflect the minor changes in wording of RMTTC to RTC and change in name of the ETR Department to ETR Office. The full document with the reflected changes is at Annex 8.

7.6.3 The Panel reviewed a draft questionnaire that could be used by the WMO-RTCs in their self-assessment. Use of an instrument such as this would allow more consistent monitoring and reporting and provide a basis for the WMO-RTCs to commence their self-assessment. The WMO-RTC could choose to look at additional areas but the Panel recommends that this questionnaire acts as the basis of the self-assessment. The self-assessment questionnaire is at Annex 9. Further questions and comments were raised on this Questionnaire by Panel members and will be looked at by ETR Office in due course.

7.6.4 The Panel recommended that where possible, an ETR staff member participate in the external review process of the WMO-RTC to ensure that the ETR Office has first hand experience of the Institute and its programmes. This information is of importance to the Training Activities Division and to the Education and Fellowships Division.

7.6.5 The Panel prepared a schedule for assessments of RTCs in the period 2008-2015 and nominated a convenor for the assessments scheduled for 2008, 2009 and 2010.

Year	RTC/Country	Convenor	Date
2008	Costa Rica	Spangler	
	Egypt	Lagha	
	Barbados	Johnson	
2009	Argentina	Salcedo	
	Kenya	Wellens Mensah	
	Madagascar	Billard	
2010	Philippines	Park	
	Uzbekistan	RA VI rep	
	India	Wang	
2011	China		
	Turkey		
	Russian Fed.		
2012	Italy		
	Venezuela		
	Algeria		
2013	Niger		
	Nigeria		
	Angola		
2014	Brazil		
	Islamic Rep. of Iran		
2015	Israel		
	Iraq		

7.7 WMO EDUCATION AND TRAINING SYMPOSIUM, TIMING, ROLE AND THEME(S)

7.7.1 The Panel noted that the Tenth WMO Symposium on Education and Training (18-22 September 2006) was held in Nanjing, China. More than 135 educational experts, managers, university professors, directors/principals of the WMO-RTCs, trainers and scientists from NMHSs, as well as specialists in new educational technology participated. The general theme of this Symposium was "Meteorological and Hydrological Education and Training for Disaster Prevention and Mitigation". The Panel was informed that much of the success and enjoyment of the Symposium was due to the excellent local arrangements and assistance of the China Meteorological Administration and the WMO-RTC component of the Nanjing University of Information Science and Technology (NUIST).

7.7.2 The participants of the Symposium highlighted the need for specific training targeted at both those who deliver and those who use meteorological and hydrological information and products for early warning and disaster preparedness.

7.7.3 The Symposium participants made the following recommendations for the worldwide meteorological and hydrological community, in particular for relevant training institutions and organizations at national, regional and international level:

- Encourage meteorological / hydrological education and training for targeted user groups, including public, media, schools, emergency responders and others.
- Promote the development of training on the use of ensemble forecasts for meteorologists and hydrologists, with special emphasis on the support for risk

assessment by decision-makers and the use of probabilistic forecasts by agriculture groups, emergency managers, health authorities, aviation operators and regulators, and other economic sectors.

- Further enhance the capacities of the WMO-RTCs and training units of NMHSs.

7.7.4 The Panel noted that the next Symposium is scheduled for 2010 and noted with appreciation the offer from the Republic of Korea to host the Symposium. The Panel further noted that the previous Symposium was also in RA II and, in the 2010 timeframe there is at least one other major WMO meeting in RA II (CAeM XIV in Hong Kong in February 2010). The Panel recalled Mr P. Manso's words from the opening ceremony of "*old problems, new vision*" and in a lively debate considered whether this could form part of the theme for the next Symposium. In the end the Panel agreed whilst Mr Manso's words were inspiring the conference title should be more forward looking and agreed on a theme of "*New approaches to Education and Training of meteorological and hydrological forecasters*". This title allows the Symposium to focus on the Education and Training issues within the major WMO (Weather, Climate and Water) programmatic themes as part of the planning for the next financial period.

7.7.5 Noting the earlier discussions and recommendations from this session regarding the aeronautical meteorology qualification / certification issues, and that CAeM XIV occurs in February 2010, the Panel recommended that the Symposium be held prior to the next Panel session to allow any recommendations from the Symposium to be considered by the Panel in the preparation EC LXII in July 2010, input for WMO Congress in 2011 thus planning for the sixteenth financial period.

7.8 NATIONAL FOCAL POINTS (NEW ROUND)

7.8.1 The Panel noted with appreciation the establishment in 2006 of a network of Education and Training National Focal Points (NFPs). The NFPs provide ETR a specific contact in these NMHSs for educational and training issues. ETR have used this network to update Members on topics such as new modules from COMET, opportunities to participate in online training organised via groups such as EUMETSAT and reminders of deadlines for requests such as the 2006 Survey. Recently the NFP was used to confirm that the main topics identified as short- and long-term training needs in the 2006 Survey were still valid. In 2007 this network was updated and it now consists of 115 members of whom 80 have valid email contacts. The Panel considered this initiative as a very valuable tool to enable more co-ordination on technical issues between the Secretariat and WMO Members.

8. DATE AND PLACE OF THE NEXT SESSION

The Panel agreed that its next session be organized after the Symposium in 2010 but prior to EC LXII to provide input into EC deliberations leading up to Cg-XVI. The Panel noted with appreciation the offer from Dr Spangler for the USA to host the next meeting in Boulder.

9. APPROVAL OF THE DRAFT REPORT

The Panel reviewed the draft report of the session and approved it, subject to the inclusion of agreed corrections and editorial amendments.

10. CLOSURE OF THE SESSION

The Chairman of the session expressed his satisfaction with respect to the constructive spirit in which the Panel worked throughout the present, as well as previous sessions. He commented on the positive aspects of holding the Session outside Geneva to allow the Panel to see first hand the WMO-RTCs they are supporting and aspects of the

NMHSs of the host country. In closing he once again thanked the host country for their excellent arrangements and the work done by the local organizers.

The session was closed on 21 March 2008 at 16:55.

REVISED AGENDA

1. ORGANIZATION OF THE SESSION
 - 1.1 Opening of the session
 - 1.2 Approval of the agenda
 - 1.3 Programme of work

2. MAJOR OUTCOMES OF Cg-XV and EC-LIX
 - 2.1 Major outcomes of Cg-XV for education and training
 - 2.2 Major outcomes of EC-LIX for education and training
 - 2.3 WMO Strategic and Operational Plans

3. EXCHANGE OF VIEWS ON THE GOALS AND OBJECTIVES OF THE WMO EDUCATION AND TRAINING PROGRAMME (ETRP)

4. IDENTIFICATION OF WMO HUMAN RESOURCE DEVELOPMENT REQUIREMENTS
 - 4.1 WMO ETR Survey 2006 on Members' training needs, special HRD needs of LDCs
 - 4.2 Information on ETR needs from other Secretariat Technical Departments
 - 4.3 Information on ETR needs from Fellowships requests
 - 4.4 Information on ETR requirements from CAeM interactions with ICAO
 - 4.5 Information from ETR Focal Points/Rapporteurs on Education and Training
 - 4.6 Accreditation and Certification in Meteorological Education and Training

5. ETRP TRAINING ACTIVITIES
 - 5.1 Training events organized / planned by WMO
 - 5.2 Training events organized by Members and co-sponsored by WMO
 - 5.3 Training Publications and Resources
 - 5.4 Opportunities and examples of Distance Learning
 - 5.5 WMO Regional Training Centres (WMO-RTCs)
 - 5.6 Planned use of Moodle as a course management tool

6. ETRP GAP ANALYSIS
 - 6.1 Introduction

7. REPORT ON THE EDUCATION AND TRAINING OFFICE
 - 7.1 Implementation of the WMO Training Classification
 - 7.2 Interaction with COCOM
 - 7.3 Report of WMO Fellowships Programme
 - 7.4 Training Management Team: Cross Programme Co-ordination
 - 7.5 TerMET – Terminology in meteorological education and training
 - 7.6 Programme for external assessment of RTCs (past and future)
 - 7.7 WMO Education and Training Symposium, timing, role and theme(s)
 - 7.8 National Focal Points (new round)

8. DATE AND PLACE OF NEXT SESSION

9. APPROVAL OF THE DRAFT REPORT

10. CLOSURE OF THE SESSION

LIST OF PARTICIPANTS

MEMBERS	
Dr Alexandre I. BEDRITSKY Chairman, EC Panel of Experts on Education and Training Russian Federal Service for Hydrometeorology and Environmental Monitoring 12 Novovagankovsky Street 123995 MOSCOW Russian Federation	TEL: (7-095) 25-31-467 FAX: (7-095) 25-39-484 E-mail: bedr@mecom.ru
Ms Olga PETROVA Assistant to Dr I. A. Bedritsky	TEL: (7-095) 25- 25-500 FAX: (7-095) 25-25-500 E-mail: olpetrova2004@yandex.ru
Dr Gustavo V. NECCO Adviser, National Met. Directorate Francisco A. Vidal 715 Apto. 901 MONTEVIDEO 11300 Uruguay	TEL: (59-82) 711-9524 E-mail: Gustavo.necco@gmail.com
Mr K. JOHNSON Manager, National Service Office 3140 University Way, Kelowna BC V1V1V9 Canada	TEL: (1-250) 491-15-10 FAX: (1-250) 491-15-06 E-mail: kent.Johnson@ec.gc.ca
Ms. Meihua WANG Chief, Human Resources Development Division China Meteorological Administration 46 Zhongguanchun Nandajie, Haidian District 100081 BEIJING China	TEL: (86-10) 684-06-702 FAX: (86-10) 684-07-696 E-mail: wangmh@cma.gov.cn
Dr V. CASTRO Professor School of Physics, University of Costa Rica 2060 San Pedro SAN JOSE Costa Rica	TEL: (506) 207-51-42, 811-35-83 FAX: (506) 207-56-19 E-mail: vilmac2001@yahoo.com vcastro@cosmos.ucr.ac.cr
Mr J. WELLENS MENSAH Acting Director Hydrological Services Department P.O. Box MB 501 ACCRA Ghana	TEL: (233-21) 677-833 FAX: (233-21) 677-384 E-mail: hsd@ghana.com
Mr Christophe BILLARD Deputy Director Ecole nationale de la météorologie (ENM) 42, avenue Gaspard Coriolis 31057 TOULOUSE CEDEX, France	TEL: (33-5) 61-07-94-16 FAX: (33-5) 61-07-96-30 E-mail: christophe.billard@meteo.fr

Mr K-J. PARK Director General, Gangwon Meteorological Regional Administration Korea Meteorological Administration 460-18 Shindaebang-dong, Dongjak-gu, SEOUL 156-720 Republic of Korea	TEL: (82-33) 643-0364 FAX: (82-33) 647-0364 E-mail: kjpark@kma.go.kr
Dr C. GARCIA-LEGAZ Director Meteorological Training Centre AEMET Leonardo Prieto Castro 8 C-Universitaria 28040 MADRID Spain	TEL: (34-91) 58-19-860 FAX: (34-91) 58-10-253 E-mail: Carlos.Legaz@inm.es
Dr T. SPANGLER Director Cooperative Program for Operational Meteorology, Education and Training (COMET) P.O. Box 3000 BOULDER, CO 80307 USA	TEL: (1-303) 49-78-473, 51-73-917 FAX: (1-303) 49-78-491 E-mail: tspang@ucar.edu
Ing. A. SALCEDO Jefe, Departamento de Meteorología e Hidrología, Facultad de Ingeniería Universidad Central de Venezuela Ciudad Universitaria CARACAS Venezuela	TEL: (58-212) 605-30-49 FAX: (58-212) 605-32-46/605-30-39 E-mail: Salcedo54@hotmail.com
INVITED EXPERTS	
Mr C. WEBSTER Manager Professional Development & Consulting MetService P.O. Box 722 WELLINGTON 6140 New Zealand	TEL: (644) 470-0761 FAX: (644) 473-5231 E-mail: webster@metservice.com
Dr I. DRAGHICI Counselor Romania National Met. Administration Sos. Bucuresti-Ploiesti No. 97 013686 BUCHAREST Romania	TEL: (40-21) 316-3645 FAX: (40-21) 316-3143 E-mail: ion.draghici@meteo.inmh.ro

Mr I. LISK WMO Manager Met Office Fitzroy Road EXETER EX1 3PB UK	TEL: (44-1392) 885-135 FAX: (44-1392) 885681 E-mail: ian.lisk@metoffice.gov.uk
WMO SECRETARIAT	
Mr J. WILSON Director Education and Training Office 7bis, Avenue de la Paix, Case postale No. 2300 1211 GENEVA 2, Switzerland	TEL: (41-22) 730-82-94 FAX: (41-22) 730-80-41 E-mail: Jwilson@wmo.int
Mr I. Al-Atwi Chief, Training Activities Division Education and Training Office, WMO	TEL: (41-22) 730-82 94 FAX: (41-22) 730 80 41 E-mail: ial-atwi@wmo.int
Ma. Leonila M. ALEGRE Administrative Assistant Education and Training Office, WMO	TEL: (41-22) 730 83 98 FAX: (41-22) 730 80 41 E-mail: nalegre@wmo.int
Mr Uri GOLUBEV Freelance Interpreter C/o WMO Geneva	
LOCAL INTERPRETER	
Mr T. ROINISHVILI Freelance Interpreter SAN JOSE Costa Rica	TEL: (506) 2281-1409, 8896-1696 E-mail: temo_roinish@yahoo.com

Proposed Education and Training Programme Deliverables and Key Performance Targets for the WMO Operating Plan

Education and Training Programme (ETRP)																		
E.R.		T.L.O	Deliverables	Timeline												Key Performance Targets	Summary of activities	
In sequence	Link with ER in SP			2008				2009				2010		2011				
121.	7	I	Improved assessment of education and training needs and capabilities of WMO Members and thereby improved planning of WMO's services with respect to subjects to be taught, level of training, training materials, teaching language, categories of personnel to be trained, regional specifics and balanced geographical coverage.	X	X	X	X	X	X	X	X	X	X	X	X	X	<p>Create coordinated training needs assessment for WMO which is representative of WMO membership</p> <p>This needs assessment is used by the WMO to set priorities in the area of education and training</p>	<p>Statistical and research studies, published materials, advisory services.</p> <p>One world wide-survey on Member's training requirements, capabilities and opportunities will be designed and implemented.</p> <p>Reports from rapporteurs on education and training of regional associations and technical commissions.</p>
122.	7	II	Enhanced capacities of NMHSs in developing countries particularly Least Developed Countries (LDCs) in planning their human resources development and fulfilling their mandates.											X	X	<p>Increased support to NMHSs, especially LDCs, in HR planning directed toward the fulfillment of their mandates.</p>	<p>Workshops, advisory services, meeting of experts.</p> <p>Publications and guidance materials.</p> <p>One training workshop on human resources development planning for LDCs.</p>	

Education and Training Programme (ETRP)																	
E.R.		T.L.O	Deliverables	Timeline												Key Performance Targets	Summary of activities
In sequence	Link with ER in SP			2008				2009				2010		2011			
																	Co-sponsoring of at least six training events/year in various fields of specializations in meteorology and related subjects.
123.	7	II	Improved management of national and regional training institutions and improved skills of national trainers on curriculum development and teaching methods through training of trainers on management skills, curriculum design and training techniques.	X			X	X		X		X	X	X		Improved tools available for RTCs and national training organisations. Qualitative or quantitative feedback from (number) of LDCs in terms training capacity.	Training seminars and workshops, publications and guidance materials. One world-wide symposium on education and training. Four regional seminars for national trainers. Three workshops to improve the pedagogical skills and science base of trainers. Effectively evaluate, qualitatively and quantitatively, training seminars and other activities.
124.	7	II	Improved capabilities of national and WMO Regional Training	X	X	X	X	X	X	X	X	X	X	X	X	Increased use of e-learning	Expert body meetings, advisory services,

Education and Training Programme (ETRP)																	
E.R.		T.L.O	Deliverables	Timeline												Key Performance Targets	Summary of activities
In sequence	Link with ER in SP			2008			2009			2010		2011					
			Centres in developing their education and training programmes through the provision of training publications and specific guidance, including production and enhanced exchange/sharing of training materials and distance/e-learning projects.													resources increased exchange of training materials Increased availability of training resources in the WMO official languages changes and improved training capability in RTCs following reports from external assessments	visiting scientists, electronic and published training materials. Provision of advisory services, some of these being tailored according to specific requests. Preparation and translation of training materials. 3 RTCs per year have external assessment
125.	9	I	Increased capabilities, knowledge and skills of professional and technical staff at NMHSs particularly at LDCs through education and specialized training in meteorology and hydrology.	X	X	X	X	X	X	X	X	X	X	X	X	Analysis of post-fellowship reports demonstrates that needs of NMHSs, are being met, especially in LDCs	Quarterly meeting of FELCOM and regular implementation of fellowships Monitoring of fellows. Provision of about 100 long-term and short-term fellowships per year related to basic and specialized training in meteorology and hydrology. Completion of post-

Education and Training Programme (ETRP)																	
E.R.		T.L.O	Deliverables	Timeline												Key Performance Targets	Summary of activities
In sequence	Link with ER in SP			2008				2009				2010		2011			
																	fellowship reports and analysis of results.
126.	9	III	Greater awareness of students and general public on weather, climate and water, their socio-economic benefits and the impact of their related natural disasters through education and outreach activities in meteorology, hydrology and related fields.			X				X			X		X	Contribution towards increasing international cooperation on the area of outreach activities on school and popular education in meteorology and hydrology.	International and regional meeting e.g. EWOC and GLOBE Programmes and Expert team meetings.
127.	9	II	Improved management capabilities of newly appointed Directors of NMHSs from developing countries	X	X	X	X	X	X	X	X	X	X	X	X	Provision of 8 familiarization visits per year. Feedback from LDCs or developing countries that familiarization visits have improved their management procedures.	Familiarization visits to two other NMHSs and to WMO for Directors from LDCs or developing countries. Monitoring of familiarization visits. Request to recipients to provide a report on the familiarization visits.

Additional Deliverables suggested for inclusion into the WMO Operating Plan

9		Support Members, particularly the LDCs, through the establishment of WMO standards related to education and training of aeronautical forecasters to meet ICAO requirements.																														Increased number of aeronautical forecasters supporting LDCs and developing countries	investigate feasibility of establishing regional aviation weather forecasting centres
9		Support Members, particularly the LDCs, in providing and maintaining adequate level in education and training in leading edge scientific applications within the WMO mandate.																														increased number of nationals of LDCs working as qualified aeronautical forecasters	facilitate education of existing non-degree staff
10		Improved efficiency of training activities.																														all non-degree aeronautical forecasters working toward a degree	work with RTCs to develop programmes for certified aeronautical forecasters
																																Establishment of distance learning degree programme in meteorology	Establish Expert Team to explore degree programmes via distance learning
																																prepare WMO guidelines on application of distance learning in meteorological education and training	develop guides and recommendations based on leading edge education and training technologies
																																guidelines developed for education and training in ensemble prediction systems	
																																Increased number of training events which include more than one constituent body	Through Training Management Team, seek additional opportunities for coordination.
																																Harmonization of training	

Information on ETR requirements from CAeM interactions with ICAO

4.4.1 Introduction

The Panel recalled the report of the twenty-first session of the EC Panel of Experts on Education and Training where a primary issue related to the implementation of the new WMO personnel classification and how Members could ensure that their aeronautical meteorological personnel are suitably qualified. In particular, WMO-No.258 defines the duties of:

WMO Meteorologists – ‘... include operational day-to-day work such as weather analysis and forecasting ...’

WMO Technicians - ‘... include carrying out weather, climate and environmental observations, **assisting** weather forecasters in the preparation and dissemination of analyses, forecasts, weather warnings, ...’

The use of the word ‘**assisting**’ in the definition of WMO Technicians at least *implies* that they are not expected to operate as **independent** forecasters.

In respect of aeronautical meteorological personnel, the International Civil Aviation Organisation (ICAO) publication, *Annex 3 to the Convention on International Civil Aviation (Chicago, 1944) Standards and Recommended Practices relating to Meteorology* states under paragraph 2.1.5 that, ‘**Each Contracting State shall ensure that the designated meteorological authority complies with the requirements of the WMO in respect of qualifications and training of meteorological personnel providing services for international air navigation**’ and goes on to note that, ‘**Requirements concerning qualifications and training of meteorological personnel in aeronautical meteorology are given in WMO Publication No.49, Technical Regulations, Volume 1 – General Standards and Recommended Practices**’.

WMO Publication No.49 [B.4] 1 – *Education and Training of Meteorological Personnel* paragraph 1.1 states, ‘**Each Member shall ensure that, in the fulfilment of its national and international responsibilities as prescribed in other chapters of these Technical Regulations, the personnel involved are trained to the standards recognized by WMO for their respective duties**’ and goes on to note that, ‘**The WMO publication...-No.258 has been designed to advise Members on the desirable standards of meteorological education and training**’.

The Supplement No.1 to WMO-No.258 – Training and Qualification Requirements for Aeronautical Meteorological Personnel (2006) sets out the WMO requirements for the training and qualification of Aeronautical Meteorological Personnel. Paragraph 1.3 of the Supplement states that, ‘In the context of the current WMO classification, an AMF is a Meteorologist specialising in aeronautical meteorology and an AMO is a Meteorological Technician specialising in weather observing for aviation purposes. Those operational aeronautical forecasters who had fully qualified as “WMO Class II meteorologists” prior to 31 December 2004, and who continue to meet all the competency requirements as set out in the current Supplement would also be categorised as AMF.’

The implementation of the two tier classification has caused difficulties for air navigation MET service providers in most countries in the developing world and also for many in the developed world. Many training establishments in RA I, II and III are still running ‘old’ WMO Class 2 forecaster training programmes whilst in other parts of the world e.g. the South Pacific Islands, there is simply not enough money to invest in recruiting and then fully training WMO Meteorologist forecasters. Indeed in the case of the South Pacific Islands,

several 'non-compliance' issues pertaining to the provision of MET services have been filed by ICAO in the Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) List of Deficiencies. There is also the much older issue of many aeronautical MET staff in the developing world simply not having access to the required training in the aeronautical MET training topics listed in section 2.4 of the Supplement No.1 (aviation) to WMO-No.258.

4.4.2 Operational Training Priorities 2008-2012

Standard/generic BIP-M (forecasters) and BIP-MT (observers) training programmes. This is a common requirement for all MET personnel, the only (but significant) difference being that aviation MET are actually mandated to conform to international air navigation regulations;

Standard/generic MET refresher courses i.e. use and interpretation of NWP, satellite, radar, AMDAR products;

Aeronautical MET specialist meteorological knowledge and skills i.e. the ability to be able to identify, understand, forecast and be aware of the impacts of the primary aviation impact variables (airframe icing, turbulence, wind shear, volcanic ash, low cloud/poor visibility, thunderstorms and associated phenomena);

Understanding of the role and functions of the WAFS, WAFC, VAAC and TCAC and best practice use of associated guidance and products e.g. support ICAO in the provision of guidance and training in the use of the new WAFC gridded icing, turbulence and cumulonimbus cloud products due to be introduced by the WAFCs in 2010;

Understanding of the role and functions of MET and MET Watch Offices and best practice in the production and issuance of aeronautical MET products i.e. SIGMET, low-level significant weather charts, AIRMET, TAF, METAR, Trend, SPECI etc;

Customer focus/consultation best practice i.e. application of knowledge of flight planning and ATS/ATM needs, aerodrome, aircraft and airline operating limits and needs;

Knowledge and best practice use of aeronautical telecommunications and information services i.e. NOTAM/ASHTAM/SNOWTAM, SADIS and ISCS, AFTN.

4.4.3 Non-operational Training Priorities 2008-2012

All states are mandated by ICAO to recover the costs of ICAO Annex 3 services through cost recovery mechanisms. The 2007 WMO CAeM survey revealed that 71% of the respondees (only 35% of members responded) had implemented cost recovery;

With effect from 2010 there will also be a mandatory ICAO requirement for all air navigation service providers to have in place an approved ISO 9000 based Quality Management System.

4.4.4 Current status of WMO Members regarding qualifications

The results of the WMO 2006 Survey showed that only about 43% of countries required BSc in science / meteorology or higher degree as minimum qualifications for training as aeronautical forecaster, ie nearly three fifths of the responding Members do not comply with the guidelines in WMO-258. For training as an aeronautical observer, 78% of countries required certificate/diploma or vocational training as a minimum qualification, 4% of countries accept qualifications lower than secondary school, and 18% have some other approaches.

On the basis of these figures and other information it would appear that many WMO Members (in particular those in the developing countries and the Least Developed Countries) will have difficulty demonstrating that their AMF meet the WMO/ICAO requirements.

SUBMISSION ON SOUTH PACIFIC ISLAND EDUCATION and TRAINING ISSUES

Prepared by Mr Christopher Webster, Head of Training, MetService, New Zealand

References

- 1 PAN-XXIII/Doc. 4, section 4.4.1
2. WMO FACT-FINDING MISSION TO FIJI, Nadi and Suva, Fiji, 9-13 July 2007

Ref 2 describes the recent operational status of Fiji Meteorological Service (FMS), which is experiencing an acute shortage of professional forecasting staff. The Mission Report noted (in its point 39): "Recruitment and retention of staff is a major risk factor for FMS, and given the tight global market for skilled meteorologists, and the standard terms and conditions of employment offered by the Fiji Government Public Service, the mission team concluded that it would continue to be difficult to retain specialist staff, which would threaten the short- and long-term delivery of services by FMS/RSMC Nadi-TCC".

The Pacific region is a vast and sparsely populated region, with many separate island nations. The region is also meteorologically significant.

New Zealand has a long (more than 50 years) and continuing association with the NMHSs of most South Pacific nations. This is mainly through New Zealand Official Development Assistance (ODA) programmes and the management of UKMO and similar organizations' programme funds. New Zealand's meteorological contribution, and its consultative and empathetic approach to the region, is highly valued by the South Pacific Islands.

There is an inadequate supply of university graduates in mathematics and physics to support forecast offices in South Pacific nations. For example, New Zealand's MetService made it widely known in the South Pacific that there were places available on its 2008 ab-initio course. However no suitable candidates were nominated. This was mostly for academic reasons although in one case a position was not secured for an applicant from FMS because the New Zealand Government had placed funding for Fiji nationals on hold.

The South Pacific Islands have the highest aid per capita ratio compared to other countries in the developing world. Despite huge funding support provided to FMS in the last three decades, it is struggling to meet its national, regional and international obligations. Ref 2 reaffirms this concern about future sustainability.

It is New Zealand's view that South Pacific NMHSs should concentrate on providing high quality meteorological observations and the necessary instrument maintenance to support it. Island nations trying to establish their own independent forecast offices is unrealistic, in our view, given the small population and the extreme shortage of suitably qualified graduates. The concept of a "Pacific Meteorological Organization" has been proposed but turning this into a reality is probably many years away.

In the shorter term, there are currently a few South Pacific NMHSs that have non-graduate forecasters. Like the situation in many other countries, for these forecasters to continue issuing warnings for aviation, they will need some mechanism to obtain certification.

**EC Criteria for the Recognition of WMO Regional Training Centres
(EC-LVIII, June 2006 reviewed version)**

I. To be designated as a WMO Regional Training Centre (WMO-RTC), institutions which undertake training in meteorology, hydrology and related sciences should satisfy the following criteria:

- a) A Centre should be established only to meet the expressed requirements of two or more of the Members that cannot be met by existing facilities;
- b) A Centre should be designed to meet the requirements of the Region, as expressed in a decision of the regional association as recorded in a resolution or statement in the general summary of the Abridged Report or, in the intersessional period, upon the request of the president of the regional association, after consulting all its members;
- c) Each Centre should be within the particular Region concerned and its location decided by the Executive Council, in the light of the views of the regional association, or its president after consulting its Members, the advice of the technical commission concerned, and the comments of the Secretary-General;
- d) The following conditions should apply to each Centre:
 - The Centre should be open to students from all countries in the Region and, upon request, from interested countries in other Regions;
 - The education level of the various courses of instruction carried out at the Centre should be consistent with the guidance material issued by WMO;
 - The Centre should have processes in place to identify, with the support of the regional association Rapporteur on education and training, training needs and to evaluate the training provided;
 - The Centre should have adequate buildings and training facilities, and have the necessary equipment and facilities for an efficient and effective use and exchange of training aids and modules based on modern technology;
 - The Centre should have competent instructors in terms of both their technical ability and training skills;
 - The Centre should have adequate arrangements for administration, governance, planning and self-assessment.
- e) The establishment and maintenance of the Centre will largely be the responsibility of the host country. WMO shall have the right to monitor the work of the Centre.

II. The obligations of WMO and the host country should be the subject of a signed Agreement to abide by certain principles between WMO and the host country, and this could cover the following matters:

- The purpose and functions of the Centre;
- The number and entrance qualifications of students;
- The right of WMO to examine syllabi and other relevant material to ensure that the level of education and training is consistent with the guidance material issued by WMO (e.g. publication WMO-No. 258 and its supplements);
- The administrative arrangements of the Centre;
- WMO obligations - financial or otherwise;
- Obligations of the government of the host country;
- Obligations of the Centre;
- Withdrawal of the designation of the Centre;
- Termination of the Agreement.

Summary Reports from RTC external assessments

WMO-RTC	Summary observations	Recommendations
<p>WMO-Regional Training Centre, Belem, Brazil.</p> <p>Dr C. Depradine (Barbados), September 2006</p>	<p>The RTC at the University of Para provides a high level of training in meteorology and, to a lesser extent, hydrology. It serves the Brazilian states well and its programmes are available to other Portuguese speaking countries.</p> <p>The proposed curriculum at the B.Sc. level is quite good and will provide a mixture of theoretical and applied meteorology, which will enable students, as is currently the case, to enter into several areas apart from forecasting. Efforts are being made to follow closely the recommendations in the WMO guidelines in Publication 258 whilst at the same time meeting local requirements.</p> <p>The staff are well qualified and actively involved in research projects. This provides opportunities for students to be involved in field work and analysis of data.</p> <p>Lower level Entry and Mid level courses are not offered routinely, but will be provided if there is sufficient demand.</p>	<p>The computer facilities should be upgraded and increased to about 25 for student use.</p> <p>Classrooms should be upgraded to make use of the latest multi-media projection equipment.</p> <p>The Centre should embark on a continuing education programme for its graduates and also enhance its community outreach programmes.</p> <p>WMOs' suggested tripartite arrangements for training should be more vigorously pursued to help improve the number of foreign students.</p> <p>The Centre should actively seek to ensure that it has access to high-speed internet capabilities that are available locally.</p> <p>Some effort should be made to translate some more of the WMO manuals into the Portuguese language for the benefit of the student body.</p>
<p>WMO-Regional Training Centre, De Luanda, Angola</p> <p>Mr C. Billard (France) and Mr M. Mabika (Angola) October 2006</p>	<p>The training activity at the RTC in Luanda, Angola, is just starting again after a long break due to an internal difficult situation.</p> <p>There is a strong willingness to host as many foreign students or trainees as possible, according to the requirements set out by WMO for the establishment and recognition of an RTC.</p> <p>The syllabi and other relevant material available suggest that the level of education could be effectively consistent with the international guidance material and standards currently issued (e.g. WMO-258 guidelines).</p> <p>It is recommended that WMO renews its accreditation to IHFR as an official Regional Training Centre. This renewal should be accompanied by firm and sustainable commitments adopted by the RTC in order to dramatically reduce the gap between its current situation and the</p>	<p>To seek to be completely inserted again in the RTC framework; this would probably imply international assistance.</p> <p>To strengthen local educational capabilities with the help of some wisely chosen experts.</p> <p>To select carefully the teachers whose job has a great impact on the final quality of training; then to train them appropriately and to evaluate the results and efficiency of the global training process.</p> <p>Finally to conduct, on a regular and short-term basis, external assessments of the general level of development reached by the RTC in accordance with the defined target.</p>

	minimum criteria defined for being accredited, by a delay of two years.	
<p>WMO-Regional Training Centre, Tehran, Islamic Republic of Iran.</p> <p>Mr Ahmed Lagha (Algeria) and Dr S. Tajbakhsh (Islamic Rep. of Iran) October 2006</p>	<p>The Centre has excellent facilities with high level instructors and organizes long- term training in useful fields for WMO-RA II Members, particularly in maintenance of instruments. The external assessment team expresses a positive judgement about the quality of training delivered by the RTC Tehran, and considered as globally satisfactory the programmes, the number of students and trainees hosted, as well as the number of foreign students. The WMO should continue to recognise the IRIMO training centre (domestic and international components) as the WMO Regional Training Centre for RA II.</p>	<p>The syllabus for the long-term training urgently needs to be upgraded to conform to the 4th edition of WMO 258. Training of trainers and new supplement to WMO 258 in some fields such as radar meteorology, satellite meteorology be considered by WMO to improve the quality of training at the RTC of Tehran. RA II Members should take more advantage of the capabilities of the Centre and its programmes. The RTC should seek options to have its training programmes validated by and external body such as a university.</p>
<p>WMO-Regional Training Centre, Bet Dagan, Israel.</p> <p>Mr B. Soriano, Jr. (Philippines) and Dr J. Lomas (Israel) February 2007</p>	<p>The RTC satisfies to a sufficient extent the current criteria of WMO for the establishment of RTCs. It meets all of the conditions applicable to a WMO Regional Training Centre. Its strength is in agrometeorology applications, the main subject for most of the training courses conducted in the Centre. It has the capability to provide training to meteorological and hydrological personnel in synoptic meteorology, hydrology and climatology. It has the resources (venue, audio-visual and IT equipment, training/reference materials, highly qualified instructors etc.) to expand its training activities in the current global issues and concerns like climate change, trans-boundary air pollution and natural disaster management.</p>	<p>It is highly recommended that the RTC in Israel continue to provide more training courses in agricultural meteorology in Israel to make best use of their facilities, particularly for developing countries rather than sending its staff abroad to provide courses. The RTC could expand its training activities (using local Israeli experts) to include courses on desertification and, disaster preparedness and prevention in addition to further addressing other topics of global concern.</p> <p>Israel Meteorological Service and the WMO-RTC organize seminar-workshops on the socio-economic benefits of meteorological and hydrological services to apprise all stakeholders of the significant benefits derived from these services.</p>

RTC Review Programme – Review process and Self-assessment

I. The Review Programme

1. Introduction

The 48th Session of the Executive Council agreed mechanisms for the continuous monitoring of RTC activities. In addition to the WMO Education and Training Office continuing to monitor these activities, a two-step review process would be applied to every RTC every two financial periods. That process would consist of a self-assessment followed by an external review.

The aim of the review process is to support the RTCs in providing high quality training programmes, which contribute to meeting regional training needs. In this way the RTC network will become more efficient and focused on the highest priority needs of the WMO community. In addition there will be the sharing of good practice and innovative approaches to education and training.

The review process is designed to:

- Assess the degree to which an RTC satisfies the current WMO criteria for the recognition of an RTC.
- Reveal the strengths of the training programmes provided by the RTC and areas for development.
- Support the RTC in identifying ways of developing its training activities so as to enhance the quality, relevance and scope of what is on offer.
- Monitor the support given to WMO fellows.
- Help the RTC obtain potential leverage to acquire critically needed resources.

2. Review Process

The review process consists of two steps.

- *Self-assessment.* The self-assessment carried out by an RTC includes an assessment of the current training programmes and the degree to which the RTC satisfies the current criteria for establishing an RTC. It is recognised that performing this assessment might lead to the RTC correcting, or planning to correct, any particular deficiencies before the external review takes place.
- *External review.* The external review is carried out by a Review Team, appointed by the Chairman of the Executive Council Panel of Experts on Education and Training. It consists of a member of the Panel, as convenor, a member nominated by the Permanent Representative of the RTC host country, and a member nominated by the President of the Regional Association, preferably from another RTC. The Review Team studies the self-assessment, arranges, within the available resources, for a site visit by at least one member of the Review Team and reports its findings to the Panel for subsequent consideration by the relevant Regional Association and the Executive Council. For WMO-RTCs that possess university components, the WMO monitoring should take into account the autonomous university assessment procedures. Therefore the external assessment of WMO-RTCs should be focused primarily on the operational component. An RTC, which no longer satisfies the WMO criteria, would have two years to correct its deficiencies.

3. Review Schedule

Once it has been decided that a review will take place and the Review Team has been appointed, the normal schedule of events is as follows.

- At least 9 months before an external review, the Education and Training Office requests an RTC to carry out a self-assessment.
- The RTC completes the self-assessment and sends it to the Education and Training Office at least 6 months before the external review.

- The Education and Training Office sends the self-assessment to the Review Team.
- The Review Team considers the self-assessment and informs the RTC about any additional information required before the external review takes place.
- At least one member of the Review Team visits the RTC and conducts the external review. A programme for the visit is proposed by the RTC. This should normally include:
 - Time for a review of the self-assessment and examination of documentation.
 - Site visits and discussions with managers, trainers and students.
 - Exit interview with the RTC Director.
- If possible there should also be a meeting with at least one high-level stakeholder of the RTC (e.g. senior member of the National Meteorological Service and/or the university to which the RTC is affiliated).
- After the external review, the Review Team has 90 days to finalise the report of the review and a one-page executive summary. During this period the RTC will have the opportunity to comment upon a draft of the report. The final report and summary are submitted to the Education and Training Office.
- The Education and Training Office sends copies of the report to the Head of the RTC, the Permanent Representative of the country in which the RTC is located and the President of the Regional Association.
- The Education and Training Office sends a copy of the final report to the Chairman of the EC Panel of Experts on Education and Training for his/her approval to dispatch to the remainder of the Panel. The Panel considers the report and recommendations on an intra-session basis. If there is unanimous agreement, the Chairman of the Panel advises the following Executive Council meeting of the recommendation of the Panel regarding the RTC. If the Panel cannot come to an agreement the Chairman of the Panel advises the following Executive Council that the WMO-RTC has been assessed but the EC Panel needs further time to consider the report and recommendations.
- The report is considered at a meeting of the Panel of Experts on Education and Training and its deliberations and associated recommendations are included in the minutes of the meeting. The minutes also include an executive summary from the report as an Appendix.

4. Self-assessment

A self-assessment is prepared by a RTC before an external review takes place. A list of questions that could be addressed during the self-study can be found in the Appendix. These questions serve as guidelines and should not be considered as a rigid format.

The document describing the self-assessment should not only describe the existing training programmes, but also indicate both short-term and long-term plans. In this sense, the self-assessment should reveal both the track-record and aspirations of the RTC.

The self-assessment should cover the following criteria.

- The RTC is open to students from all countries in the Region and, upon request, from interested countries in other Regions.
- The education level of the various courses of instruction carried out at the RTC is consistent with the guidance material issued by WMO.
- The RTC has processes in place to identify training needs and to evaluate the training provided.
- The RTC has adequate buildings and training facilities, and has the necessary equipment and facilities for an efficient and effective use and exchange of training aids and modules based on modern technology.
- The RTC has competent instructors in terms of both their technical ability and training skills.

- The RTC has adequate arrangements for administration, governance, planning and self-assessment.

The self-assessment can also cover any other activities of the RTC that are not related to the six criteria. The aim is that the self-assessment provides the RTC and the Review Team with a full and frank assessment of the activities, facilities, plans and governance of the RTC.

II. Guidance on the self-assessment of RTC

The self-assessment is primarily intended to assist the RTC in identifying its strengths and areas for development. As well as the self-assessment being used by the RTC for its own purposes, it will also form the basis for the review carried out by the External Review Team established by the Chairman of the Panel of Experts on Education and Training.

The Review Team will give detailed consideration to five key criteria. Responses to the subsidiary questions give an indication of the kind of information that will assist the Review Team in forming a view about the extent to which the five key criteria are satisfied.

1. The RTC is open to students from all countries in the Region and, upon request, from interested countries in other Regions.
2. The education level of the various courses of instruction carried out at the RTC is consistent with the guidance material issued by WMO.
3. The RTC has processes in place to identify training needs and to evaluate the training provided.
4. The RTC has adequate buildings and training facilities, and has the necessary equipment and facilities for an efficient and effective use and exchange of training aids and modules based on modern technology.
5. The RTC has competent instructors in terms of both their technical ability and training skills.
6. The RTC has adequate arrangements for administration, governance, planning and self-assessment.

The self-assessment should include, but not necessarily be limited to, an assessment of these five key criteria. What is most important is that the RTC provides sufficient information in the self-assessment and any accompanying documentation to allow the RTC to form a realistic view about its current state and for the Review Team to carry out its task.

1. **The RTC is open to students from all countries in the Region, and, upon request, from interested countries in other Regions**
 - a) For each of the last four years what is the number of international students who have been trained at the RTC? Where do they come from?
 - b) Are there any restrictions on international students who can attend course at the RTC other than those associated with prior knowledge and skills, and language ability?
 - c) What action is taken to inform international students about training opportunities at the RTC?
 - d) What financial and/or domestic support is provided to international students and does the RTC support tripartite arrangement for the funding of WMO fellowships?
2. **The education level of the various courses of instruction carried out at the RTC consistent with the guidance material issued by WMO**
 - a) What training programmes provided by the RTC directly support meteorology and hydrology?
 - b) What training programmes provided by the RTC address other scientific and technical disciplines of interest to WMO?
 - c) What activities directly support continuing education and training?

- d) What documentation is available about the training programmes, courses and individual training sessions?
 - e) To what extent are the courses and associated training materials consistent with the guidelines in WMO No. 258?
- 3. The RTC has processes in place to identify training needs and to evaluate the training provided**
- a) How are training requirements identified, especially the regional requirements?
 - b) What is the process by which the effectiveness of the training is assessed?
- 4. The RTC has adequate buildings and training facilities, and has the necessary equipment and facilities for an efficient and effective use and exchange of training aids and modules based on modern technology**
- a) What training, technical, IT, observing and residential facilities are available?
 - b) To what extent is the budget adequate to support the mission of the RTC?
 - c) Is the instructional technology both current and adequate to support the RTC's mission?
 - d) Are there adequate library resources current and adequate to support the RTC's mission?
 - e) What use is made of computer-aided learning?
 - f) What use is made of training material that is produced outside the RTC?
 - g) What training material is exchanged with other training institutions?
- 5. The RTC has competent instructors in terms of both their technical ability and training skills**
- a) To what extent do the trainers have the requisite experience, education and training?
 - b) How is the performance of trainers evaluated?
 - c) How is the expertise of trainers in terms of their technical and training skills maintained and developed?
 - d) What is the instructional load on trainers?
 - e) What administrative and technical staff are available to support the training activities?
 - f) To what extent are trainers involved in research and development activities?
 - g) What links are there with other national and international organizations involved in meteorological activities?
- 6. The RTC has adequate arrangements for administration, governance, planning and self-assessment**
- a) What relationship does the RTC have with the NMHS and other educational institutions?
 - b) What are the planning and decision-making processes and who is involved?
 - c) What are the significant achievements associated with developing training and enhancing facilities during the last five years?
 - d) Are there any major problems or challenges facing the RTC?
 - e) What plans are there for developing the training, technical and residential facilities during the next five years?
 - f) What plans are there for developing training programmes associated with meteorology and hydrology during the next five years?
 - g) What plans are there to develop activities which directly support continuing education and training?
 - h) What plans are there to widen the scope of the training programmes to accommodate other scientific and technical disciplines of interest to WMO?
 - i) Are there any actions that could be taken to enhance relationships between the RTC and other components of the WMO community?

WORLD METEOROLOGICAL ORGANIZATION

WMO-RTC Self-Assessment QUESTIONNAIRE

Country: **Costa Rica**

Title of the WMO-RTC: Lab. De Investigaciones Atmosféricas y Planetarias,
Escuela de Fisica
Universidad de Costa Rica

Contact Name & Details: Dr Jorge GUTIERREZ C.
Director, Lab. De Investigaciones Atmosféricas y Planetarias,
Escuela de Fisica
Universidad de Costa Rica

Postal Address:

Telephone No.:

Fax No.:

E-mail Address:

Date: 25 February 2008

Part 1: Regional activities of WMO-RTC

1. Is your WMO-RTC open to students from all countries in the Region?
 All Most Few None
2. Does your WMO-RTC accept participants from other Regions?
 Yes No
3. For the last four years how many foreign students from WMO Member countries have been trained at your WMO-RTC?

Year	Total number of students	Number of foreign students
2007		
2006		
2005		
2004		

Make distinction between initial training and continuous education.

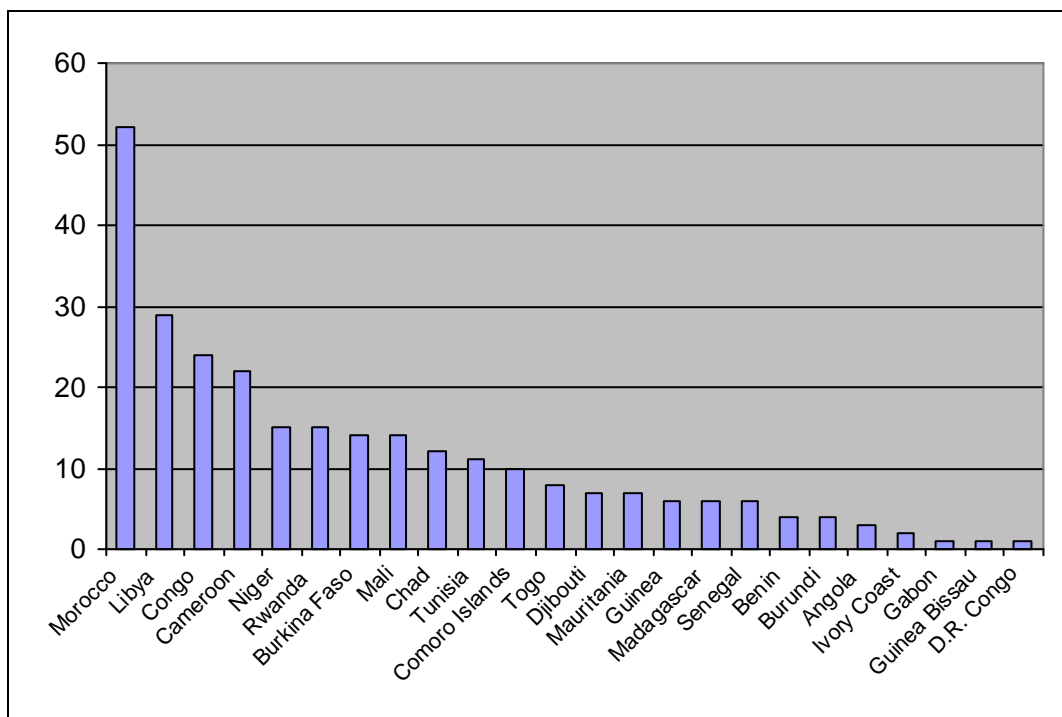
Examples of standardized information requested.

Training Title	Duration	Level
“Ingénieur de la Météorologie” Course (Master degree) <u>2005 VERSION</u>	5 academic years representing 3 228 hours (lessons, conferences, practical exercises)	Meteorologist basic instruction package at upper level, open to those having a mathematic or scientific “Baccalauréat”, with possibilities of specialisation from the fourth scholar year. Choice available : Dynamic Meteorology and numerical prediction Applied Meteorology
“Ingénieur de la Météorologie” Course (Master degree) <u>2006 VERSION and after, which allows to separate recruitment levels for Meteorologists and Meteorological Technicians</u>	3 academic years representing 1 612 hours (lessons, conferences, practical exercises)	Meteorologist basic instruction package at upper level, open to those having achieved two academic years at the university, in the college of physics or mathematics. The specialisation step is possible from the fourth scholar year. Choice available : Dynamic Meteorology and numerical prediction Applied Meteorology
“Technicien supérieur de la Météorologie” Course (Bachelor in meteorology degree)	3 academic years representing 2 089 hours (lessons, conferences, practical exercises)	Meteorological technician basic instruction package at upper level, open to those having a mathematic or scientific “Baccalauréat”, with possibilities of specialisation from the second scholar year. Choice available : Meteorological observation Applied Meteorology Meteorological instruments

Training Title	Duration	Level
Meteorological Forecasting	100 hours or credit	Meteorologist
Statistical Prediction	75 hours	Meteorologist
Aeronautical Assistance	75 hours	Meteorologist
Satellite Imagery	2 weeks	Meteorologist
Tropical and Saharian Meteorology	2 weeks	Meteorologist
Health and Meteorology	2 weeks	Meteorologist
Atmospheric Pollution and Meteorology	2 weeks	Meteorologist
Agrometeorology	Variable	Meteorologist
Statistical Climatology	4 weeks	Meteorologist
Computer science and data processing	75 hours	Meteorologist
Hydroclimatology	2 weeks	Meteorologist
Data processing with CLICOM & SYSTAT software	3 weeks	Meteorologist
Meteorological instruments	4 weeks	Meteorologist
Instruments and radiation	3 weeks	Meteorologist

Chief – Weather station Qualification	4 weeks	Meteorologist or Meteorological Technician
Chief Forecaster Qualification	4 weeks	Meteorologist
Climatological observation techniques	3 weeks	Meteorological Technician
Meteorological observations	4 weeks	Meteorological Technician
Agrometeorological observations	4 weeks	Meteorological Technician
Microcomputer science	4 weeks	Meteorological Technician
Aeronautical training courses	3 weeks	Meteorological Technician

Year	Students origin	Meteorologists (Academic degree)	Meteorological technicians			Global number of students
			Senior-level	Mid-level	Entry-level	
1998	National	6				6
	Foreigner	10				10
	WMO fellow	1				1
1999	National	4	15	7		26
	Foreigner	9				9
	WMO fellow			1		1
2000	National	5		2		7
	Foreigner	1				1
	WMO fellow	2				2
2001	National	6	11	2		19
	Foreigner					
	WMO fellow			1		1
2002	National			14		14
	Foreigner					
	WMO fellow					
2003	National	7				7
	Foreigner					
	WMO fellow					
2004	National	14		20		34
	Foreigner			1		1
	WMO fellow					



4. Are there any restrictions on foreign students/trainees students who can attend courses at your WMO-RTC other than those associated with prior knowledge and skills, and language ability?

- No
 Yes *Please specify*.....

5. How do you inform foreign students about training opportunities at your WMO-RTC?

- Through WMO Bilateral
 Regional Internet *Other*

6. Does your WMO-RTC support cost sharing of WMO fellowships and/or training activities?

- Yes No

7. What financial and/or domestic support is provided to foreign students at your WMO-RTC?

- Travel Accommodation Tuition fees
 Per Diem Meal *Other*

Part 2: Education level of various courses carried out at your WMO-RTC and their consistency with the guidance material issued by WMO

1. What training programmes provided by your WMO-RTC directly support meteorology and hydrology?

Topic	Level (Meteorologist or Met	Frequency	Constraints (language, ..)

	Technician ONLY)		

2. What training programmes provided by your WMO-RTC to address other Meteorology-support branches such as computing, data processing, management etc.

Topic	Level	Frequency	Open to other countries

3. What activities in your WMO-RTC directly support continuing education and training?

- a) Online courses yes no
- b) Chat courses yes no
- c) Discussion forums yes no
- d) Occasional news letter yes no
- e) Classical short courses yes no

4. What documentation is available for prospective students about the training programmes, courses and individual training sessions?

e.g. Internet, brochures....

5. To what extent are the courses and associated training materials consistent with the guidelines in WMO No. 258?

- Course description 100% 75% 50% < 50%
- Course content 100% 75% 50% < 50%

Part 3: The WMO-RTC has processes in place to identify training needs and to evaluate the training provided

1. How are training requirements identified, especially the regional requirements?
 WMO Survey Regional Ass. Bilateral *Other*
2. How do you assess the effectiveness of your training programmes?
 During training Post training Both *Other*

Part 4: WMO-RTC's buildings, training facilities, equipment and facilities

1. What training, technical, IT, observing and residential facilities are available at your WMO-RTC?

Computer lab. yes no Accommodation yes no

Internet connection yes no What speed? ()

Recreation facilities yes no Other

2. To what extent is the budget adequate to support the mission of your WMO-RTC?

100% 75% 50% < 50% Not adequate

3. Is the instructional technology adequate to support the mission of your WMO-RTC?

100% 75% 50% < 50% Not adequate

4. Are your library resources adequate to support the mission of your WMO-RTC?

100% 75% 50% < 50% Not adequate

5. What use is made of computer-aided learning or distance learning methods in general?

100% 75% 50% < 50% Not adequate

6. What use is made of training material that is produced outside your WMO-RTC?

100% 75% 50% < 50% Not adequate

7. What training material is exchanged with other training institutions?

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Part 5: Technical ability and training skills of the trainers

1. To what extent do the trainers have the requisite experience, education and training?

Content experience 100% 75% 50% < 50%

Training skills 100% 75% 50% < 50%

2. How is the performance of trainers evaluated?

Annually After each course Not evaluated

3. How is the expertise of trainers in terms of their technical and training skills maintained and developed?

Attending training Self education WMO training Other

Exchanges with experts Thematic watch and monitoring

4. What is the instructional load on trainers?

> 20 hrs/week 10 – 20 hrs/week less than 10 hrs/week

5. How many administrative and technical staffs are available to support the training activities?

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6. To what extent are trainers involved in research and development activities?

- 100% 75% 50% Not involved

7. What links your does WMO-RTC have with other national and international organizations involved in meteorological activities?

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Part 6: WMO-RTC's arrangements for administration, governance, planning and self-assessment

1. What relationship does your WMO-RTC have with the NMHS and other educational institutions?

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2. Who is involved in the planning and the decision-making processes in your WMO-RTC?

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3. What are the significant achievements associated with developing training and enhancing facilities during the last five years?

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4. What are the challenges facing your WMO-RTC?

1.
2.
3.

5. What plans are there for developing the training, technical and residential facilities during the next five years?

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6. What plans are there for developing training programmes associated with meteorology and hydrology during the next five years?

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7. What plans are there to develop activities which directly support continuing education and training?

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- 8.** What plans are there to widen the scope of the training programmes to accommodate other scientific and technical disciplines of interest to WMO?

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- 9.** Are there any actions that could be taken to enhance relationships between your WMO-RTC and other components of the WMO community?

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