



## **Improving the Delivery of Public Weather Services**

Evaluation of the questionnaire on improving the delivery of public weather services programmes and activities.

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# Introduction

This document contains the evaluation of the questionnaire on 'Improving the Delivery of Public Weather Services'.

The main responsibility of National Meteorological and Hydrological Services (NMHSs) is to ensure the safety of life, the protection of property and the well-being of the public they serve. They accomplish this responsibility by providing weather, climate and water services to all key social and economic sectors for application in the decision-making processes of the weather-sensitive social and economic sectors, as well as for disaster management. Hence, it is imperative that they provide warnings and forecasts in a timely, reliable and comprehensive manner.

To help the NMHSs fulfil this task, the World Meteorological Organization (WMO) in 1994 established the Public Weather Services Program (PWSP). The main purpose of PWSP is to strengthen the capabilities of WMO Members to meet the needs of the community through provision of comprehensive weather services, with particular emphasis on public safety and welfare, and to foster a better understanding by the public of the capabilities of national Meteorological Services and how best to use their services.

In order for NMHSs to effectively serve society, service has to be delivered to the appropriate sections of the community in an effective way. To achieve this, the NMHSs must work with key stakeholders in the community. Of particular importance is the effective delivery of critical warnings of hazardous weather to the emergency services and other authorities who need to react to such threats. The delivery of observations, forecast and warning products to all parts of the community requires the services of media organisations. Improving the delivery of information to these key stakeholders is critical to an effective service.

Additionally, there are always new and emerging opportunities and technologies that allow organisations to better communicate data and information with each other. As organisations embrace these changes, more efficient and effective service delivery is often achieved.

## The Survey

In order to enable WMO to facilitate targeted assistance to NMHSs, it is first necessary to understand the scope and nature of the problem that exists. To this end, the Commission for Basic Systems (CBS) Open Programme Area Group (OPAG) on PWS tasked its Expert Team on Services and Products Improvement (ET/SPI) to conduct a survey to gather the required information to help address the issues presented above.

## Purposes of the Survey

The purposes of the survey were:

- To assess the needs of NMHSs especially in developing countries regarding the PWS programme with a focus on identifying opportunities to improve products and services;
- To identify the emerging needs for new and improved PWS products and services for the emergency management community and media partners.

## The questionnaire

WMO has a membership of 188 Member States and Territories all of which have National Meteorological and Hydrological Services (NMHSs). However, this questionnaire was distributed for completion to a sample of Members during their participation in various sessions of WMO technical commissions and regional associations. It was completed by 33 Members from the six WMO Regions as indicated in the table below:

Region	Country	Number of Responding NMHSs
Region I	Senegal	7
	South Africa	
	Namibia	
	Zimbabwe	
	Ghana	
	Mauritius	
	Guinee	
Region II	Bahrain	5
	India	
	China	
	Republic of Korea	
	Oman	
Region III	Brazil	1
Region IV	USA	1
Region V	Australia	3
	Malaysia	
	New Zealand	
Region VI	Slovakia	16
	Russia	
	Azerbaijan	
	Poland	
	Ireland	
	Hungary	
	Germany	
	Italy	
	Kazakastan	
	Norway	
	Serbia	
	Switzerland	
	Turkey	
	Belgium	
	Uzbekstan	
	United Kingdom	

**Table 1. Response to the questionnaire**

Out of the responding NMHSs, there were 2 Least Developed Countries (LDCs), 21 developing countries and 10 developed countries.

Despite this rather low level of response, the answers to the questionnaire nonetheless give an indication of the state of implementation of PWS programmes and activities by NMHSs, as well as the gaps that NMHSs have identified.

The questionnaire contained questions requesting information on:

- The basic facts on Public Weather Services in NMHSs;
- The state of observational and special data;
- The access to resources open to NMHSs;
- Methods of dissemination employed by NMHSs;
- Implementation of public education by NMHSs;
- The priorities identified for a successful implementation of PWS;
- State of introduction of quality management procedures;
- State of service delivery to emergency service organisations and the media and;
- The identification of needs targeting key stakeholders.

## **The Evaluation**

As far as possible, histograms have been used to provide easy visualization of comparisons between numbers of Members' responses to particular questions. Most data could be analysed without any difficulty. Some questions needed explanations from respondents in order to put the answers in perspective. As far as possible, these explanations are highlighted in the accompanying text.

It is worth noting that all results are limited to those NMHSs which responded to the questionnaire. An extrapolation to any other NMHS cannot be drawn from these results. The 'overall remarks' at the end of each question should be regarded as suggestions.



# Summary

The survey brought out some facts about the implementation of public weather services and related activities. For example, it demonstrated the fact that NMHSs were routinely ready to deliver PWS at any time of the day (24/7) whether or not there was an emergency.

There was a wide availability of NWP data, especially at the global scale. However, there was a significant number of NMHSs which were not accessing finer grid data at meso- and regional-scales. This was an indication that such NMHSs did not have the capacity to run high resolution NWP models. There is therefore need to strategise on ways to enable NMHSs to develop capacities to generate finer grid NWP products, in support of PWS activities.

It was also demonstrated that there is need to pay special attention to the challenge of ensuring sufficient supplies of consumables meant for weather observation since data is essential for the realisation of accurate forecasts and warnings for PWS. This could be achieved through enabling NMHSs to effectively demonstrate their benefits to society in order for them to get national fiscal support. Strategies to assist NMHSs to demonstrate social and economic benefits of weather, climate and water services to governments, key economic sectors and policy-makers, as a way of enabling NMHSs attract fiscal support by their governments should be considered.

It was found out that there was need for continuous training of staff at higher levels of specialization in all the areas related to PWS. As far as core PWS activities are concerned, the survey exposed the need to train specialists in media liaison in order to serve the important role of communicating weather information, forecasts and warnings to the media as well as making use of the media to promote the brand of the NMHSs. New and innovative methods to ensure cost-effective transfer of knowledge to staff of NMHSs and end-users should be encouraged and supported.

NMHSs were found to be utilizing multiple dissemination methods to provide public weather services. This could be an indication of the success, by WMO to encourage NMHSs over the years, to develop public weather services products and to effectively disseminate them. This is particularly so as regards utilization of television, radio, print-media, Internet and telephone. There is need for WMO to promote methods that are not sufficiently exploited such as RANET, which target communities with limited resources available to them, and who would use such services to improve their quality of life.

NMHSs considered capacity building as the most important issue in attaining high quality service delivery. There was also a high appreciation by NMHSs of the need to be able to carry out Nowcasting in order to improve their warning services associated with severe weather. Training of the staff of NMHSs to be able to communicate effectively with the public and the issue of public education were also very highly rated as a priority, which indicates that organization of training workshops and seminars continues to be necessary. Sufficient focus should be directed to these stated needs while planning strategies for the development of PWS in NMHSs.

Considering the importance of the function of NMHSs, it was found imperative that as many NMHSs as possible formalize their service delivery to Emergency Service Organizations (ESOs). It is therefore necessary to develop a strategy to promote this practice among the NMHSs which may not have adopted it yet. Even in cases where the practice is in place, it may be necessary to enhance its establishment and application.

By and large, NMHSs had established themselves as the official providers of weather information to the media (radio, television and newspapers). However, there was emerging competition with NMHSs in this regard posed by the readily available weather information on the Internet and by services availed by commercial service providers.

# 1. Basic Facts on Public Weather Services in NMHSs

## 1.1 Authority of NMHSs in the delivery of Public Weather Services

**Is there a formal arrangement for the provision of PWS between your NMHS and Government? (i.e. are there defined deliverables that are required of the NMHS?)**

Of the responding Members, 29 indicated that they had formal arrangements with their respective governments for the provision of public weather services. Of the remainder, three Members did not respond to the question, while only one Member indicated that they had no such formal arrangement with their Government. 23 of the Members felt that the deliverables required from the NMHSs could be categorised as 'extensive' or 'complete'. Six of them felt that the deliverables that they were expected to provide were rather 'limited', meaning that they had capacity to deliver beyond what was demanded of them.

### **Overall remarks**

The results show that the majority of the responding NMHSs were vested with adequate authority and expectations to deliver PWS. Put in another way, the majority of governments have real expectations of deliverables from their NMHSs. Hence the need for NMHSs to implement and continuously improve their public weather services programmes and/or activities.

## 1.2 Availability of PWS

**Do you provide a full time Public Weather Service?**

100% of the respondents indicated that they provide PWS on a full time bases (i.e. 24/7). From the possible choices that were open to the respondents, it could be concluded that none of the NMHSs offers part time services or services that are exclusively limited to emergency response only.

### **Overall remarks**

NMHSs are routinely ready to deliver PWS at any time of the day whether or not there is an emergency.

## 2. Observational and Specialised Data

### 2.1 Access to observational data

**Do you have access to the following observational data to support your Public Weather Service?**

The question sought to assess the level of access of NMHSs to: Standard synoptic meteorological data; Upper air data (wind); Upper air data (temp/moisture); Satellite imagery standard IR/Vis/WV; Satellite extras (SST etc); Upper atmosphere ozone; Surface UV/ Solar Radiation; Air quality; Radar: Reflectivity, Doppler, Dual Polarisation; Hydrological: Rainfall amounts, River heights, River flow; Marine: Tide Gauges, Tsunami Monitoring; Oceanographic: Buoys/Ships; and Sub-surface data.

#### Results

NMHSs indicated varying degrees of access to the following data sets: Standard synoptic meteorological data; Upper air data (wind); Upper air data (temperature/moisture); Satellite imagery standard Infrared/Visible (IR/V) and Water Vapour (WV); Satellite extras (Sea Surface Temperatures (SSTs)), and Hydrological data (rainfall amounts). 24 countries indicated that they accessed adequate to more than adequate amounts (i.e. plenty) of all of these data. The remaining 9 countries felt that they were able to access only a limited amount of one or more of these data sets. Among the data sets, upper air data was found to be hardest to access.

On the other extreme, Dual Polarisation radar data, Tsunami Monitoring and Oceanographic Sub-surface data were the least accessible of the data sets with 24 NMHSs indicating that their access to these data ranges from 'no access at all' to 'limited accesses'. Tsunami monitoring data was the least accessible of all data sets.

The access, by NMHSs, to the remaining data sets fell within the full range of possibilities (Fig 1).

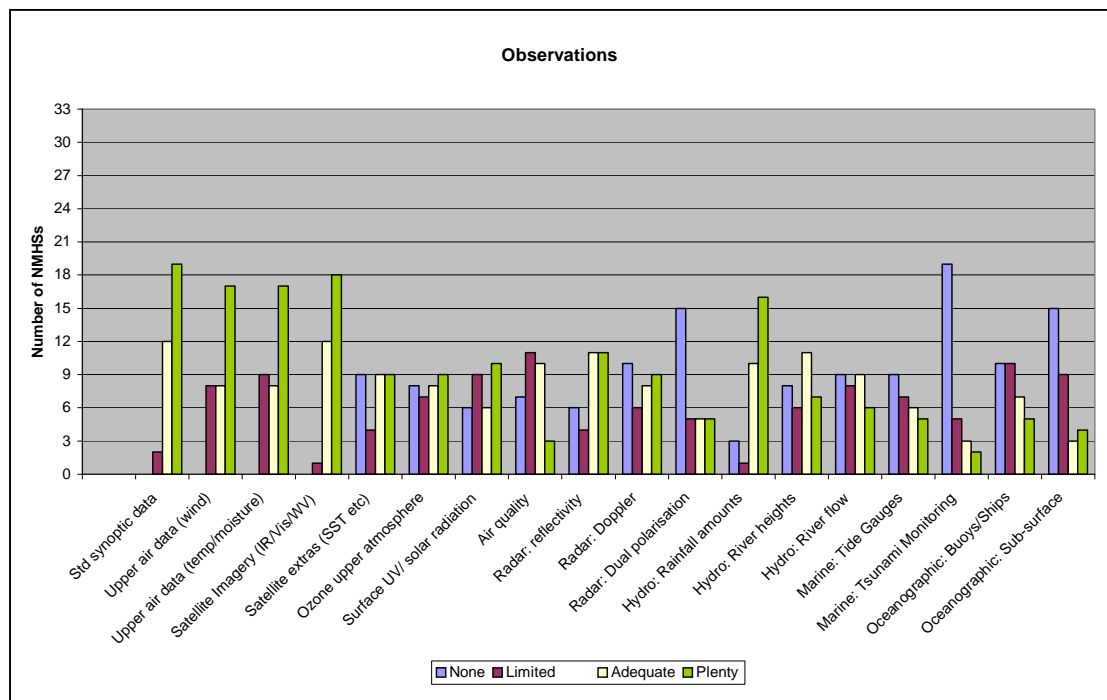


Fig 1: NMHSs access to observational data in support of PWS

### Overall remarks

Even in the categories where data access by NMHSs is appreciably high, there is still a significant number of Services which have limited access to it. There is, therefore, need to focus on assisting NMHSs improve data collection and access for almost all data sets that support PWS. This applies to developing countries and LDCs, mostly.

## 2.2 Access to specialised data

### Do you have access to the following value-added data to support your Public Weather Service? Where is it obtained?

The data sets considered in this question were: Numerical Weather Prediction NWP (Global); NWP (Regional); NWP (Meso-scale); and Climatological records.

### Results

Of the 33 NMHSs which responded to the questionnaire, those which indicated that they accessed adequate to more-than-adequate data were: 26 for global NWP data; 22 for regional NWP data; 16 for meso-scale NWP data; and 28 for climatological records. However, a significant 15 of them indicated either limited access or even complete lack of access to meso-scale NWP data. It is worth noting that no NMHS indicated complete lack of access to global NWP data.

Regarding the source of the data, it was clear that some NMHSs sourced data in-house as well as from other sources such as from other NMHSs or from international NWP sources. 9 NMHSs generated their own global NWP data while 24 sourced the data internationally (Fig 2).

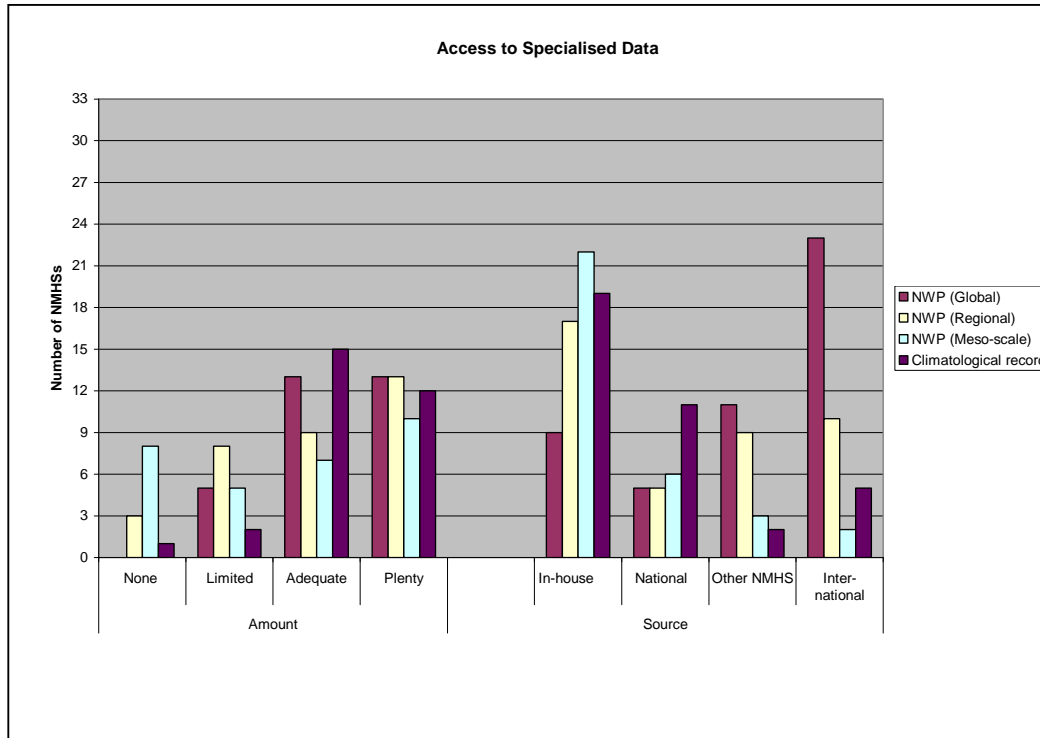


Fig 2. NMHSs access to specialised data

### Overall remarks

There was a wide availability of NWP data, especially at the global scale. However, there was a significant number of NMHSs which were not accessing finer grid data at meso- and regional- scales. This indicated that such NMHSs did not have the capacity to run high resolution NWP models. There is therefore need to strategise on ways to enable NMHSs to develop capacities to generate and post process finer grid NWP products, in support of PWS activities.

## 3. Access to Resources by NMHSs

### 3.1 Technical resources

**Question: Do you have access to the following technical resources to support your Public Weather Service?**

The question sought to assess the availability of certain resources which facilitate PWS such as national energy supply, different forms of communications systems and computing facilities. The specific resources considered were: continuity of utilities (electricity, etc), telephone/fax (incoming), telephone/fax dissemination, incoming Internet, outgoing Internet, incoming Global Telecommunications (GTS) data-links, dissemination GTS data-links, computing hardware, computing software, and meteorological workstations.

#### Results

Of the 33 NMHSs which responded to the questionnaire, 22 indicated more-than-adequate continuity of supply of utilities such as electricity while 7 of them felt that they lacked adequate continuity of supplies. Only 4 NMHSs felt that they were experiencing a limited supply of the utilities. Similarly, 30 NMHSs were satisfied with both incoming and outgoing telephone and fax facilities, and rated the availability of the facilities as adequate or more-than-adequate. Only 3 NMHSs felt that they were limited in their access to incoming and outgoing Internet facilities. Regarding the Global Telecommunications Network (GTS), most NMHSs indicated that they had plenty of GTS facilities but nonetheless 13 NMHSs rated their GTS facilities as inadequate. Regarding computing hardware and software, 4 NMHSs felt that the facilities at their disposal were limited. Although 24 NMHSs had adequate or even plenty of workstations, there were a few NMHSs which had none at all or felt limited in this respect (Fig. 3).

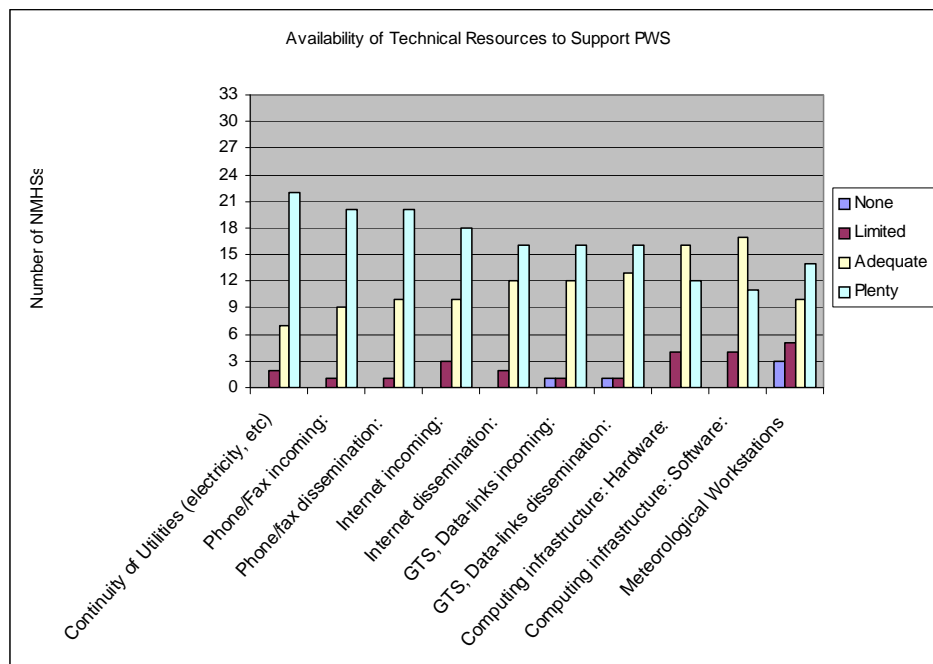


Fig 3. Availability of technical resources to support PWS in NMHSs

## Overall remarks

Despite the high number of NMHSs which had indicated 'adequate' or 'better-than-adequate' rating in access to communication and computing systems, there is still a significant number of NMHSs which have either limited facilities or in some cases, such facilities are absent altogether. This is especially so in developing countries, making enhancement of communication systems in support of PWS a priority.

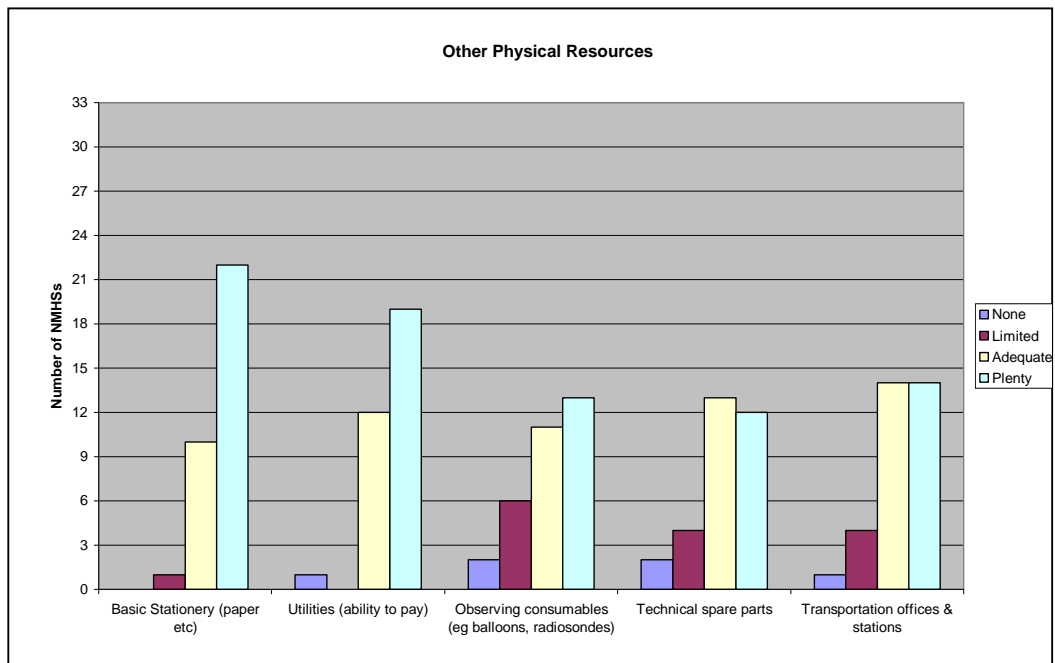
## 3.2 Other physical resources

### Do you have access to the following basic resources to support your Public Weather Services?

The physical resources considered were: Basic stationery (paper, printer ink, etc), the ability to pay for utilities, weather observation consumables (e.g. balloons, radiosondes), technical spare parts, and transportation between offices & stations.

## Results

Regarding the physical resources considered here, 25 NMHSs indicated that they had either adequate or plenty of those resources. It is, however, noteworthy that out of those resources, consumables for weather observation such as balloons and radiosondes were the least available. In fact, 8 NMHSs indicated either limited access or a complete lack of those particular consumables. Similarly, there was a significant number of NMHSs which were finding technical spare parts and transportation between offices & stations a challenge, and they indicated either none or limited access to those resources (Fig 4).



**Fig 4. Access by NMHSs to basic resources to support PWS**

## Overall remarks

There is need to pay special attention to the challenge of ensuring sufficient supplies of consumables meant for weather observation since data is essential for the realisation of accurate forecasts and warnings for PWS. Strategies to assist NMHSs to demonstrate social

and economic benefits of weather, climate and water services to governments, key economic sectors and policy-makers, as a way of enabling NMHSs attract fiscal support by their governments should be considered. This support would, in turn, enable NMHSs acquire the vital physical resources.

### 3.3 Human resources

**What is the capability of your human resources to support your Public Weather Service? Do you have problems with language in WMO or similar training programmes?**

The questions sought to establish the status of human resources in NMHSs especially as regards vital areas in meteorology, hydrology, oceanography, Information Technology, systems maintenance and media liaison, and to what extent language is likely to affect the capacity of NMHSs to benefit from WMO PWS capacity building activities.

#### Results

27 out of 33 NMHSs indicated that they had either adequate or above-adequate supply of staff in general. 20 of them rated their staff supply in meteorology, IT and systems maintenance as either adequate or above-adequate. There were some NMHSs for which there was no staff specialised in hydrology, oceanography, IT, systems maintenance or media liaison. In all areas of specialization, and mostly in the area of media liaison, there were seven NMHSs which indicated that supply of staff was limited (see Fig. 5).

Regarding language, no NMHSs indicated that they experienced language problems at WMO training activities all the time. However, 9 NMHSs indicated experiencing problems sometimes. 20 NMHSs indicated that they experienced no language problems at all with WMO capacity building activities.

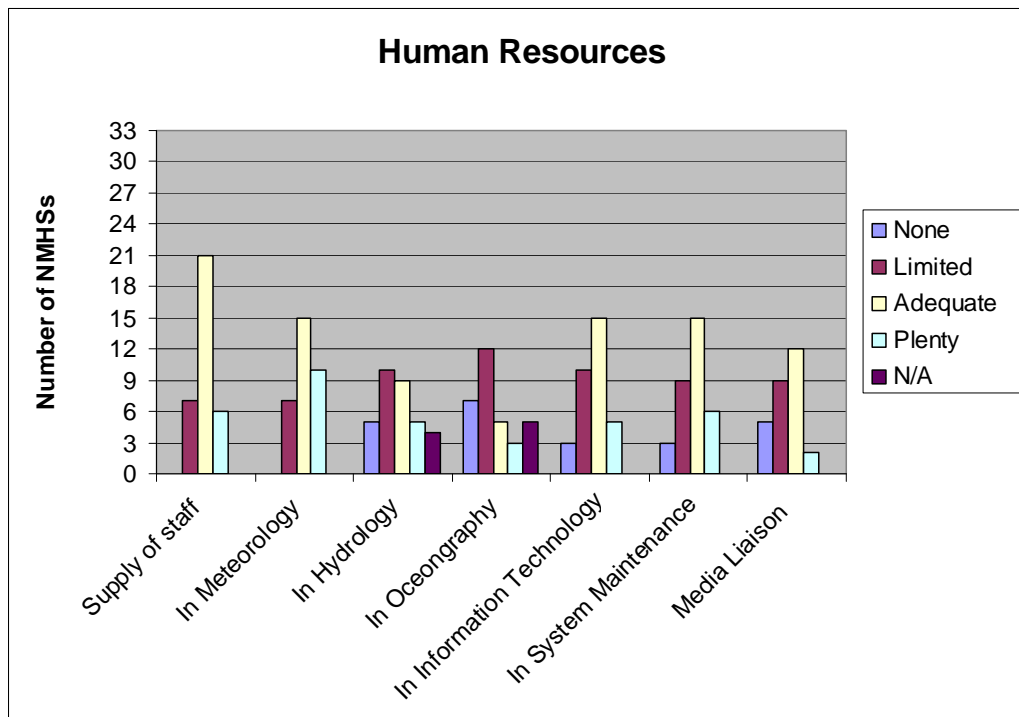


Fig 5. Human Resources in NMHSs



### **Overall remarks**

There is need for continuous training of staff at higher levels of specialization in all the areas investigated. As far as core PWS activities are concerned, the survey exposed the need to train specialists in media liaison in order to serve the important role of communicating weather information, forecasts and warnings to the media as well as making use of the media to promote the brand of the NMHSs. New and innovative methods to ensure cost-effective transfer of knowledge to staff of NMHSs and end-users should be encouraged and supported.

As regards language, the need to provide interpretation and translation at WMO activities should always be determined and be responded to as necessary.

### **3.4 Support from adjacent NMHSs**

#### **Do you receive support from adjacent NMHSs? If so, please list the kinds of support.**

This question was useful in assessing the level of support that adjacent NMHSs gave to each other. Mutual support among neighbouring NMHSs in many respects ranging from data exchange to coordination of issuance of warnings regarding high impact weather phenomena was investigated.

#### **Results**

21 of the 33 NMHSs which responded indicated that they received varying levels of support from adjacent NMHSs. Most of them categorized the level of support as 'Extensive'. 7 NMHSs indicated 'No Support', while the remaining 5 did not respond to this particular question. Examples of the kinds of support NMHSs gave each other included the following: Ireland received UKMO NWP outputs to the GTS, radar data exchange, daily exchange of weather forecast briefings, lightening detection information (from the Lightening Detection System at Valencia); The UK got European services within EUMETSAT, ECMWF, EUMETNET and in radar data exchange; Senegal received support in marine information from Morocco; India received varied support from Bangladesh, Sri Lanka, Pakistan, Nepal, Iran and the Maldives; The USA got support in data exchange and forecast coordination from Canada; hurricanes and forecast coordination from the Caribbean Islands; and support in typhoons and tsunami forecast coordination with SE Pacific Island States and Central Pacific etc.

#### **Overall remarks**

While a majority of NMHSs indicated that they received support from adjacent NMHSs, there was still an appreciable number of NMHSs for which this was not the case. There is therefore need for WMO to put in place a strategy for encouraging neighbouring NMHSs to support each other in the various areas which would be of mutual benefit to them.

## 4. PWS Methods of Dissemination

### Via what methods do you provide public weather services?

The methods of delivery of weather services to the public which were investigated included television, radio, the Web, telephony and specialised technologies such as satellite-phone, RANET, marine radio and Inmarsat.

### Results

The dissemination methods indicated as 'extensively' utilised and accounting for over 19 NMHSs which responded included dissemination by telephone, Web site, national radio and fax, in that order. Out of those methods, the telephone was indicated as most utilised by 27 NMHSs. Free-of-charge television, commercial radio and third-party web sites were also reported to be extensively used but in fewer cases (16 NMHSs). The methods least utilized were the more specialised ones including satellite-phone, marine radios and Inmarsat as well as the old technology such as telex. RANET, as a specialised and also relatively new method, appropriate for developing countries, was also indicated not to be used by most NMHSs (Fig 6).

### Overall remarks

NMHSs were found to be utilizing multiple dissemination methods to provide public weather services. This could be an indication of the success, by WMO to encourage NMHSs over the years, to develop public weather services products and to effectively disseminate them. This is particularly so as regards utilization of television, radio, print-media, Internet and telephone. There is need for WMO to promote methods that are not sufficiently exploited such as RANET, which target communities with limited resources available to them, and who would use such services to improve their quality of life.

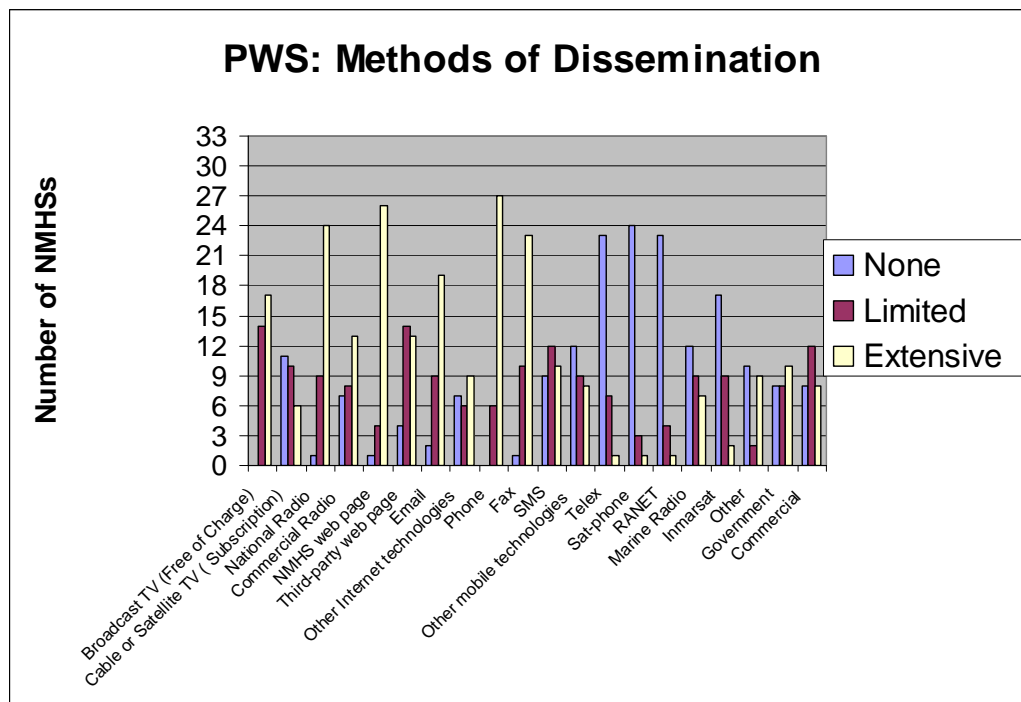


Fig 6: Methods of Dissemination

## 5. Public Education Program

### What methods do you use to provide information to the public about your Public Weather Services program?

The question was for the purpose of assessing the level of usage of various methods of informing the public about the NMHSs' Public Weather Services. The methods, for which the level of usage was investigated, included: information Web pages on the Internet, school curriculum (in the primary, secondary and tertiary levels), TV/radio advertising, newspaper advertising, public meetings, information booths at trade or agricultural shows and, targeted key stakeholder meetings.

### Results

The outstanding feature of the results was that the provision of information on public weather services programmes and activities in NMHSs by all the methods investigated, except through the Internet was largely either limited or none existent. Information through the Internet was the only method whose use was rated as 'extensive' by 19 NMHSs. The methods rated second highest were the use of TV and radio, and brochures. There was an outstanding lack of information on PWS programmes throughout all the levels of education: primary, secondary and tertiary (Fig. 7).

### Overall remarks

While there is high usage of Internet to inform the public of the PWS programmes and activities of NMHSs, there is nonetheless need for NMHSs to use other available means if they are to achieve full effect. There is therefore need to encourage NMHSs to inform the public about their PWS programmes through a full range of methods including all those investigated here. For example, the potential to inform future generations through targeting youths at all the levels of education (primary, secondary and tertiary) should be tapped. Likewise, the use of display booths in trade or agricultural shows provides an excellent opportunity to reach a large cross section of society.

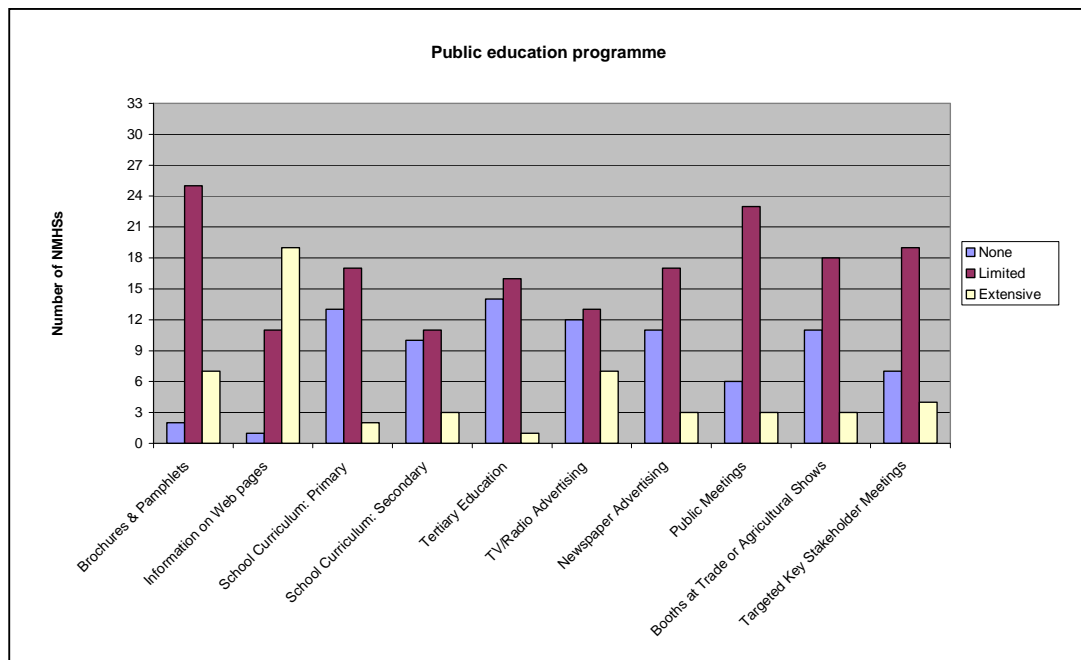


Fig 7: Methods used to provide information about PWS programs to the public

## 6. Priorities

**These are the key areas that have been identified from earlier surveys: Please rank them in order of priority for your NMHS where you need help to improve your PWS programme. You may include an extra item of your choice if you feel we have omitted an issue that is of special concern to you.**

Some issues had been identified as the ones of highest concern to NMHSs during earlier surveys carried out by the PWSP. Here, an attempt was made to prioritise these issues.

The issues considered were:

- Capacity building (forecast accuracy; products; preparation and presentation of media materials);
- Computer hardware & software;
- Communication with the public (effective product delivery);
- Public education;
- Research and linking with institutes and agencies;
- Training;
- Enhancing warning services;
- Coordination with disaster management agencies;
- Opportunities for combining resources and operations with other agencies or adjacent countries;
- Threat from commercial meteorological service providers;
- Development of applications in Nowcasting.

It was noted that 6 of the 33 NMHSs which responded to the questionnaire did not respond to this question and hence the analysis is based on the 27 NMHSs which did answer.

### Methodology

In order to discern and compare priorities assigned to each issue by NMHSs easily, a Priority Index was defined and worked out for each issue. The index was based on the assumption that the highest priority issue to NMHSs would be assigned priority rank number one more times than any other issue would be. Therefore, the sum total of priority rankings to the issue by the NMHSs would be smaller than the sum of rankings for any other issue. Following the same principle, the second highest priority would also receive the second lowest total, and so on. The Priority Index for each issue ( $P_i$ ) was then defined as, 'the reciprocal of the sum total of rankings for each issue ( $R_i$ ) multiplied by 1000'.

$$P_i = (1/R_i) * 1000$$

This manipulation had the effect of converting the totals of rankings to simple indices represented by numbers from 0 to 12, and it also followed that the larger the index ( $P_i$ ), the higher the priority of the issue. A histogram of these indices was then plotted.

### Results

The issue of capacity building for the improvement of forecast accuracy, development of products and for the preparation and presentation of media materials came out as the highest priority of NMHSs with a Priority Index 12. It was followed by the need for development of applications in Nowcasting at Index 10. The issues of training of staff; enhancing warning services; communication with the public for effective product delivery; and public education were ranked at almost the same priority indices ranging from 8 to 9. The issues of coordination with disaster management agencies; opportunities for combining resources and operations with other agencies or adjacent countries; research and linking with institutes and agencies; and need for computer hardware & software were ranked at between indices 7 and 8. The lowest priority to NMHSs turned out to be the threat posed by commercial meteorological service providers at index 5 (Fig. 8).

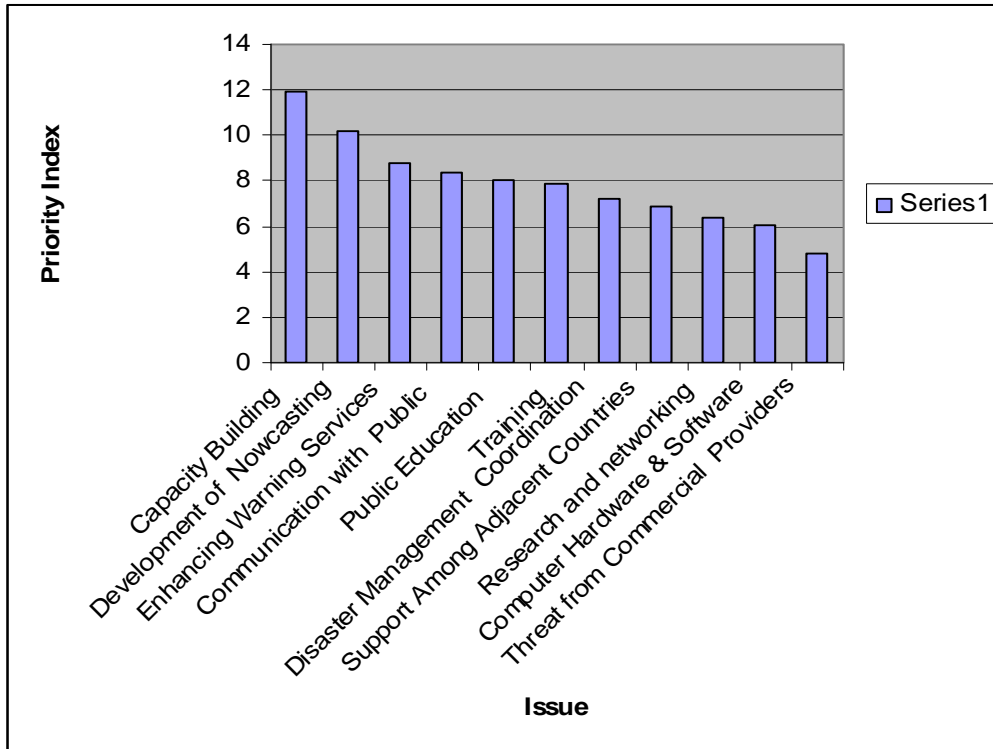


Fig 8: Ranking of priorities of issues by NMHS

#### Overall remarks

NMHSs considered capacity building as the most important issue in attaining high quality service delivery. There was also a high appreciation by NMHSs of the need to be able to carry out Nowcasting in order to improve their warning services associated with severe weather. Training of the staff of NMHSs to be able to communicate effectively with the public and the issue of public education were also very highly rated as a priority, which indicated that organization of training workshops and seminars continues to be necessary. Sufficient focus should be directed to these stated needs while planning strategies for the development of PWS in NMHSs.

## 7. Quality Management Procedures

NMHSs responded to the questions below, related to Quality Management (QM) procedures. The questions were designed to give insight into the level of implementation of the procedures. Table 1 below shows the questions and the number of NMHSs which gave each response as given in the choices.

	Yes	Limited	No
<b>Have you had any experience of QM procedures?</b>	14	17	2
<b>Do you have QM procedure in place?</b>	12	16	5
	Yes	No	
<b>Have you considered implementation or improvements?</b>	31	2	
<b>If so has the recently distributed WMO document: WMO/TD No 1258 influenced your decision</b>	16	16	
	Yes	Maybe	No
<b>Will you use this document to assist you in the future?</b>	18	14	

**Table 1: QM questions and the number of NMHSs for each given response.**

### Results

14 of the respondent NMHSs had had experience with QM procedures. 19 NMHSs had either had limited or no experience with the procedures. However, 31 of the respondent NMHSs had considered implementing it. WMO effort to promote implementation of QM through the production and distribution of WMO/TD No 1258 had assisted about half of the NMHSs but all of the NMHSs who responded intend to consider using it eventually.

### Overall Remarks

It is necessary for WMO to sustain the effort of promoting implementation of QM. Since the traditional method of producing and distributing publications had influenced about 50% of the NMHSs, it might be necessary to try new innovative approaches through country PWS Focal Points and through the 'Learning through Doing' approach.

## 8. Public weather services to Emergency Service Organisations and the Media

### 8.1 Emergency Service Organisations: PWS provided

#### Which Emergency Services Organisations do you provide direct information to?

The question was designed to enable the assessment of the services delivered by NMHSs in terms of warnings, routine forecasts, observations and face-to-face liaison with Emergency Service Organizations (ESOs). These were: police, fire, ambulance, search & rescue, other civilian ESOs, and the military.

#### Results

From the results, it was observed that NMHSs were sending warnings and routine weather forecasts to ESOs including: police, fire, ambulance and search & rescue. They were also sending these products to other civilian ESOs and the military. It was further observed that NMHSs issued more warnings than either weather observations or face-to-face liaison services to ESOs. Warnings were disseminated to these organizations more regularly than routine forecasts, except in the case of military services. NMHSs were providing warnings and forecasts to police, fire, search and rescue and military more regularly than they were providing the same products to ambulance services (Fig. 9).

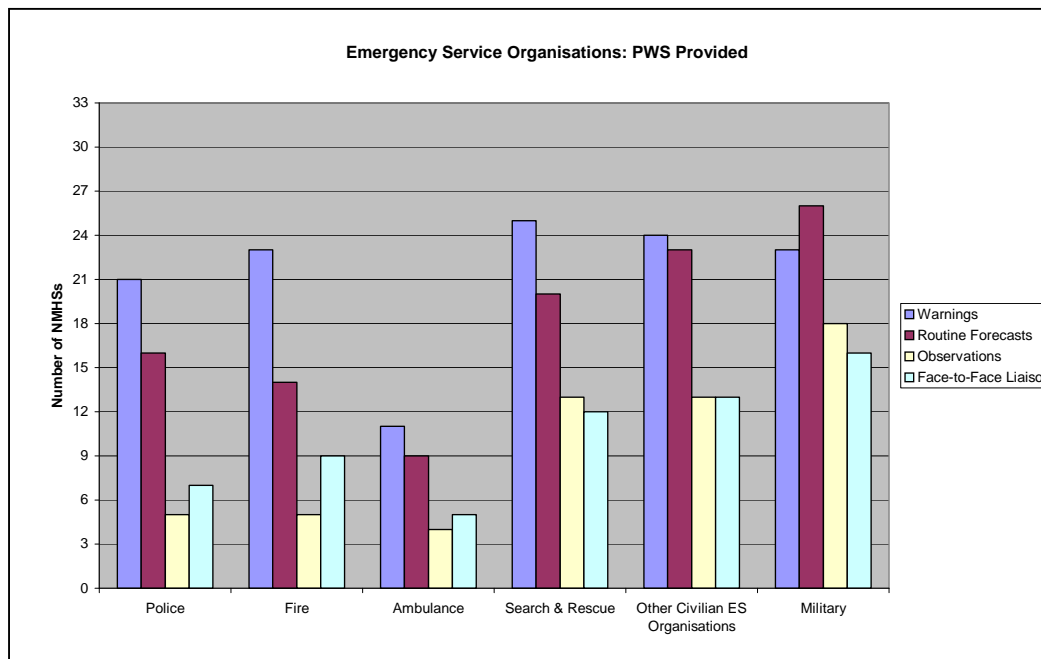


Fig. 9: PWS Services to Emergency Service organizations

### **Overall Remarks**

The predominance of dissemination of warnings and forecasts to all the emergency service organizations considered here, over the dissemination of observations and face-to-face liaison may not be surprising considering the potential of the application of these products by the organizations in question. This is because the mandate of the organizations is to safeguard life and property. Warnings and forecasts are therefore, their highest priority. However, there is need to educate emergency service organizations of the importance of observational data at certain stages of disaster management, notably the disaster response phase – for the search and rescue operations, for example. Face-to-face liaison is also an effective practice in briefing emergency organisations on the situation on the ground as well as in clarifying forecasts and warnings for increased understanding of any high impact weather that may threaten life and/or property.

## **8.2 Emergency Services: Official Arrangements**

**Is there a formal arrangement for the provision of PWS between NMHS and Emergency Service Organisations?**

### **Result**

In response to the question above, 25 NMHSs indicated that they had formal arrangements for the provision of public weather services between them and emergency service organisations while the remainder did not have such arrangements. Some NMHSs had formal high level arrangements through parliament, national and regional emergency offices. However, a majority of NMHSs had direct arrangements with national disaster management organizations. Other entities which NMHSs had formal arrangements with included ministries of water, agriculture, fisheries, health, civil protection, marine, the military, federal authorities and national cyclone committees.

### **Overall Remarks**

Considering the importance of the function of NMHSs, it is imperative that as many NMHSs as possible formalize their service delivery to ESOs. It is therefore necessary to develop a strategy to promote this practice among the NMHSs which may not have adopted it yet. Even in cases where the practice is in place, it may be necessary to enhance its establishment and application.

## **8.3 Emergency Services: Product Dissemination Technologies**

**What technologies do you use to provide PWS to Emergency Service Organisations (ESOs)?**

**Indicate availability – and planned availability if appropriate.**

**Indicate your opinion of the adequacy of the service in each category.**

**(Note: if you consider a particular technology unnecessary, then no service via this technology may still be considered as “adequate”).**

**Indicate if receipt of information by ESO is confirmed by the service provider.**

The question was designed to help assess the availability and adequacy of technologies used for provision of services to ESOs. The technologies considered were: Internet: E-mail, FTP, the Web, RSS; telephone: voice, dedicated “hotline”, fax, SMS; Pager Alert; telex; radio-link; satellite-link; video conference; pictorial spatial data; Geo-coded spatial data; common data systems – transmitting data directly into ESO databases; linked data systems – common databases; face-to-face communication; shared physical location; and other technologies.



## Results

The Internet and telephone technologies were found to be the technologies that NMHSs were using to service emergency service organizations. 30 of the NMHSs which responded indicated availability of the Web as a technology they were using while 27 NMHSs use the email. However, the FTP option was utilized by 19 NMHSs for this purpose. 29 NMHSs use the telephone technology voice option while the Fax is the next most popular option finding usage by 27 of the NMHSs. The SMS option was used by 13 NMHSs while dedicated “hotline” technology was utilized by 18 of the responding NMHSs. The other method that was found to be quite popular was the face-to-face communication which was used by 22 of the NMHSs. All these methods also scored highly in terms of adequacy. All the other methods were found to be less popular or even not available at all in many NMHSs.

The other feature that stands out is that the number of emergency service organizations which feedback confirmation of receipt of information to NMHSs was low in all cases, and almost insignificant in the case of the less popular technologies. The telephony (especially the voice option) and the email technologies were the ones which showed a significant number of NMHSs in which feedback from ESOs was practiced by 12 NMHSs.

Only 11 of the NMHSs rated the overall service to emergency service organizations as adequate while a majority of NMHSs did not indicate their rating (Fig. 10).

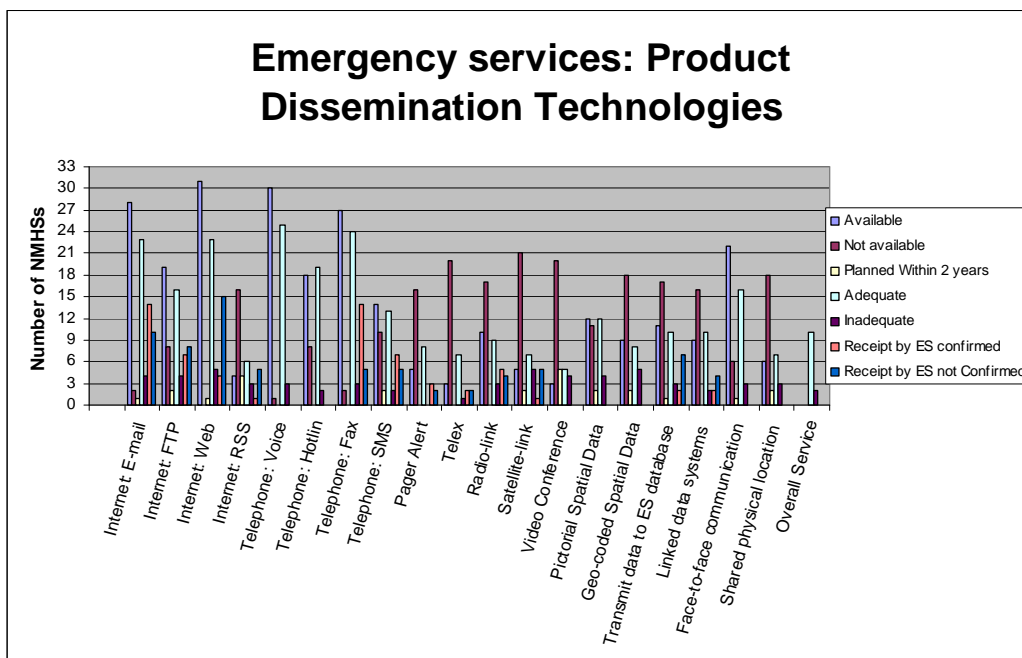


Fig. 10: Product dissemination technologies to Emergency Service Organisations

## Overall remarks

There was a widespread availability of the popular communication options based on telephony and Internet technologies linking NMHSs to ESOs. It appeared that, by and large, these organizations did receive products from NMHSs. However, feedback mechanisms had not been established to a desirable level and hence NMHSs were not able to assess the quality of their service to ESOs. It is probably because of this fact that only 11 NMHSs could confirm rendering an adequate service to the organizations. It is therefore necessary for WMO to focus on enhancing the capability of NMHSs to communicate products to ESOs, laying emphasis on establishment of feedback mechanisms as a necessary step that would

be beneficial in many ways including: User requirements – do the products fully meet the needs of the users?; User satisfaction – are the users satisfied with the format of the product, the means of disseminations etc?; and user perception – does the user understand the content of the product? Does the user have trust in the products of the NMHSs and see them as credible?

### 8.4 Media: Information Source

#### From where do the media obtain data for the presentation of PWS?

This question sought to establish the sources of information employed by the radio, television and newspaper media, and to what extent they depended on each of the sources. The sources investigated were: the NMHS as a source of information; forecasters employed by media organizations and companies; domestic private providers; foreign private providers; Internet; other NMHSs by agreement or not; academic institutions and; other government sources.

#### Results

Out of the 33 NMHSs which responded to the questionnaire, a total of 27 indicated that radio stations source all or most of their information from NMHSs. This number was 22 for television stations and 14 for newspapers respectively. None of the NMHSs indicated that they give none or little information to the media. However, a total of 10 NMHSs reported that the media sourced all or some of the products from the Internet. Domestic private providers accounted for a very low presence with a total of 20 NMHSs indicating that none or an insignificant number of TV and radio stations sourced information from domestic service providers, and 16 NMHSs reported the same rate for newspapers. All the other information sources including media own forecasters, foreign private providers, other NMHSs, academic institutions and other government sources were reported to be mainly non existent by the NMHSs or to be insignificant (see Fig: 11).

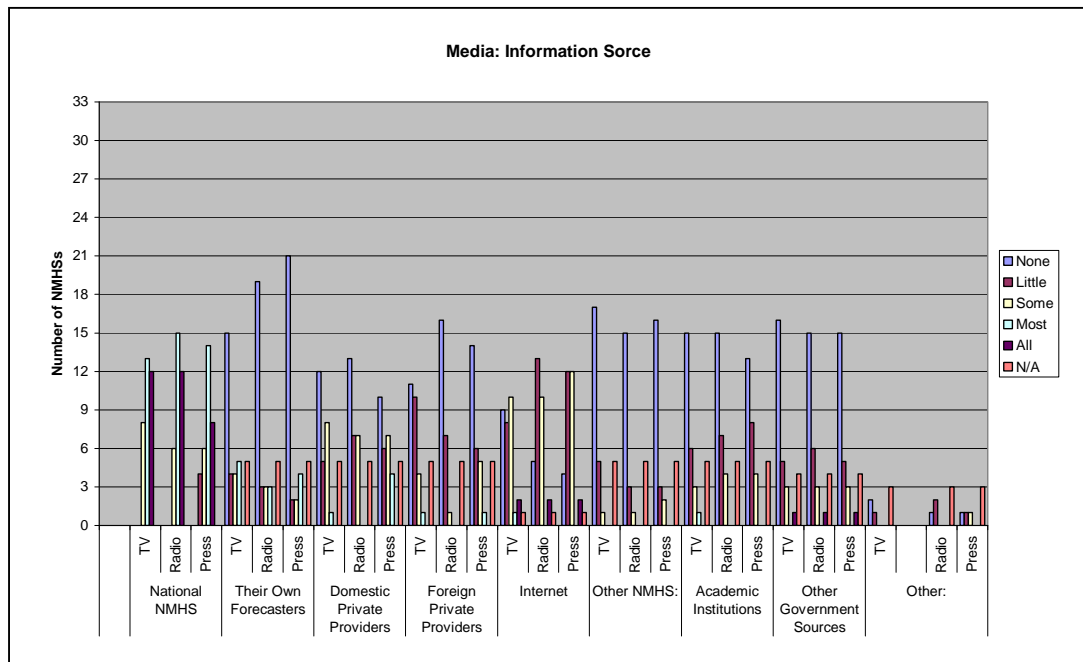


Fig 11: Media Information Sources

## Overall Remarks

By and large, NMHSs have established themselves as the official providers of weather information to the media (radio, television and newspapers). However, there was emerging competition with NMHSs in this regard posed by the readily available weather information on the Internet and by services availed by commercial service providers. There is therefore need for WMO to assist NMHSs to ensure sustained high quality public weather service delivery as well as to develop skills for branding their images and marketing their services professionally, in order to consolidate their position as the service-providers-of-choice to media organizations.

## 8.5 Media: Products

### Do your media provide regular and/or special broadcasts?

The intention of setting this question was to assess the level of usage of the radio, television and press (print) media in communicating warnings, forecasts and observations.

### Results

All of the 33 NMHSs which responded indicated that they communicated regular and special forecasts on radio and television. There was no NMHS issuing special forecasts exclusively on radio or television. Similarly, 29 NMHSs communicated regular and special forecasts through the print medium. However, 4 of the NMHSs used the print medium for special forecasts only.

NMHSs issued warnings on special occasions mostly as opposed to issuing warnings on a regular basis through all the three media. There was almost an equal number of NMHSs which issued forecasts on both special and regular basis. Both radio and television emerged as the favourite media of communication of warnings when compared to the print medium. Regarding communication of observations, it was practiced to significant levels in all the three media, regularly and also on a special products basis. However, 5 NMHSs indicated that they did not communicate observations to the media at all (Fig 12).

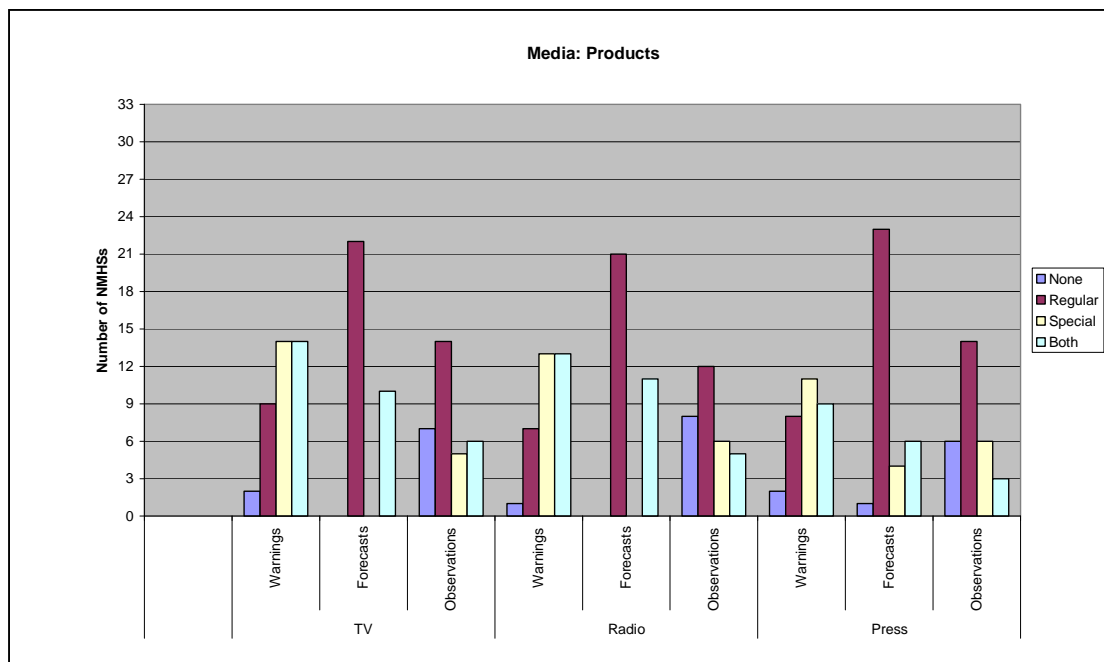


Fig 12: Usage of TV, radio and press in communicating warnings, forecasts and observations

## Overall remarks

NMHSs demonstrated effective usage of the most available form of mass media, the radio, to communicate regular and special forecasts, and warnings. This indicates that members of the public have an enhanced chance of accessing weather services. Television, a medium which most of NMHSs were using, was also widely spread although, in developing countries and LDCs, it was less available to the public outside urban areas. It nonetheless provided a handy tool for effective communication combining audio and visual forms of communication, making it possible for weather presenters to better communicate forecast uncertainties, for example. NMHSs were also using the print medium for communication of weather forecasts but less so for communication of weather warnings. This is because of the limitation of newspapers to communicate very-short-term, or frequent updates of warnings. However, they provided a handy tool for communication of observations and topical explanations of weather and climate systems of interest to the public. Usage of the print medium for this purpose should be encouraged.

## 8.6 Media: Data Formats

**Do your media provide presentations in the following formats – and where is the formatting done?**

The question was meant for the assessment of whether the television medium was providing text, voice, graphics or animated formats and whether the press medium was providing text and graphics formats. It also sought information on whether the formatting was done by the NMHSs or by media organizations themselves.

### Results

Regarding the television medium, 21 NMHSs were providing text and voice formats compared to 13 for which it was television companies which provided the formatting. There was an equal number of NMHSs and TV companies providing static graphic formats, but more television companies than NMHSs originated animated TV graphics. As for the print medium, NMHSs were overwhelmingly involved in the provision of text and graphics formats (21 NMHSs) compared to the media organisations themselves (6 NMHSs). Third party services providers were low in all categories (Fig 13).

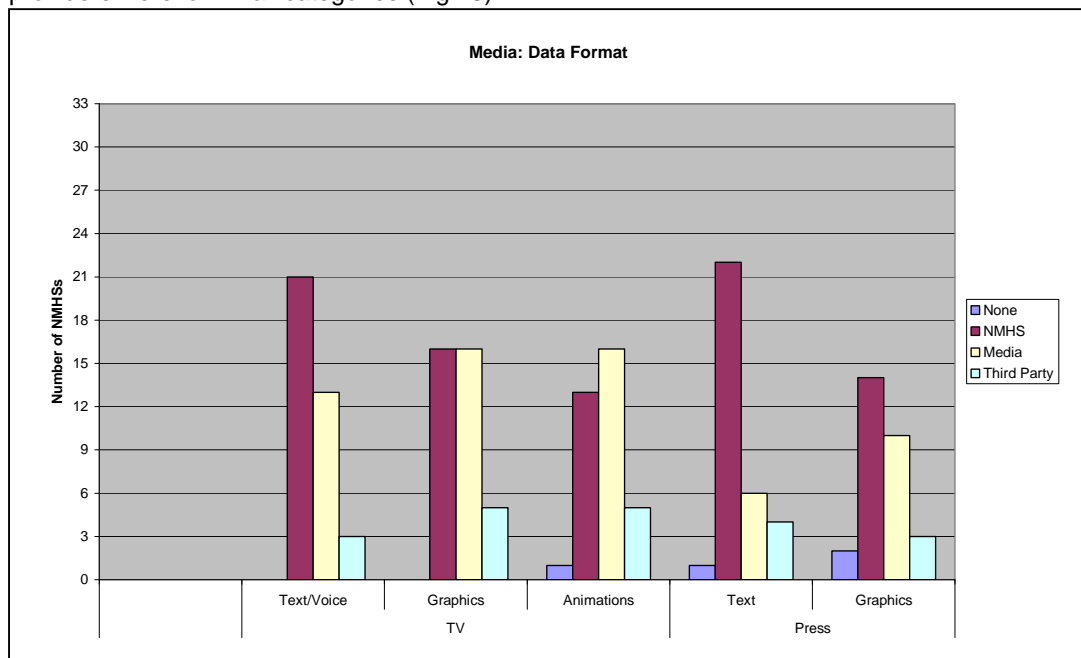


Fig13: Presentation formats and where the formatting is done

## Overall Remarks

There were strong capabilities and skills within NMHSs to format weather forecasts and warnings for television and for the press. There was also evidence of a good level of cooperation between NMHSs and media organizations in formatting of weather products. There was a good level of utilization of static and animated graphics which made weather presentations pleasant and entertaining to watch on television. There were however a small but nonetheless significant number of NMHSs who were neither producing, nor working with the media or third parties to provide animations on television or/and text or graphics formats with the press. There is therefore need for WMO to strategise on how to keep such cases to a minimum.

## 8.7 Media: Presenters

### Do your media use NMHS staff or presenters who are fully trained in meteorology?

The question helped in the assessment of the knowledge of Meteorology by weather presenters on radio and television. This is because it is desirable for a presenter to possess an appreciable understanding of the many aspects of Meteorology which are essential to weather presentation. These aspects are for example basic understanding of the different types of weather systems, their attributes, formation and propagation. A presenter also needs skills for communicating forecasts and warnings accurately including the ability to communicate forecast uncertainty etc.

## Results

13 NMHSs reported that either all or most of the TV and radio presenters were also staff of NMHSs. On the contrary, 19 NMHSs indicated that either none or few TV presenters were staff of NMHSs. This number was 17 as far as radio presenters were concerned. 12 NMHSs indicated that there were 'many' weather presenters, both on radio and television, who were not trained in Meteorology, (Fig: 14).

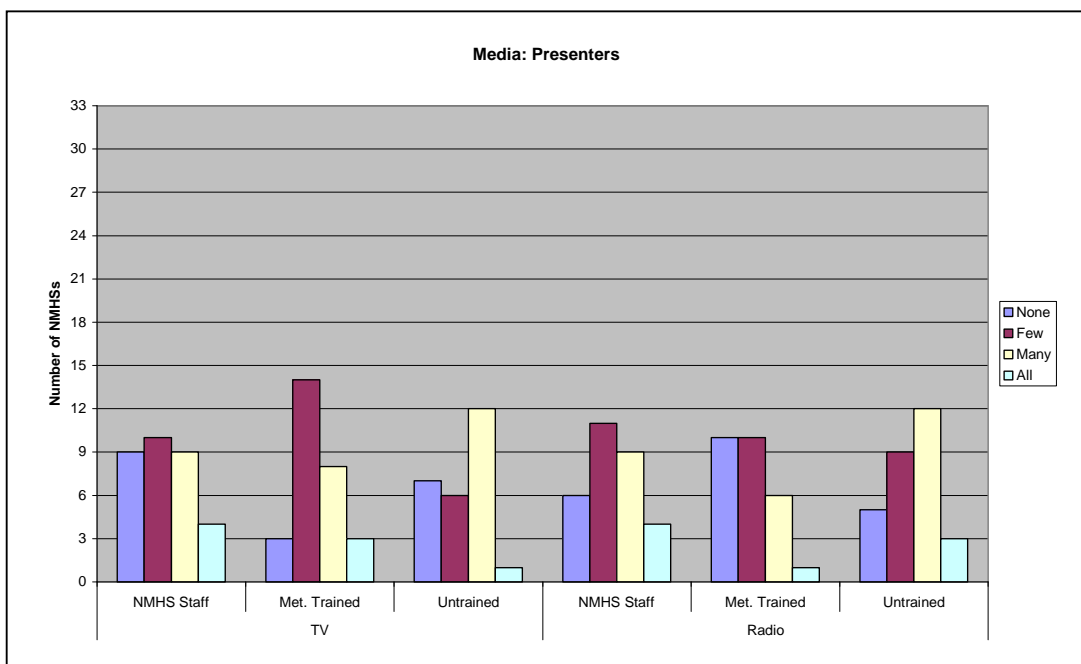


Fig: 14: Media presenters and their training in Meteorology

## Overall Remarks

There is great need for WMO to strategise on how to assist NMHSs to dialogue with the television and radio media with the view of demonstrating to the media the advantages of training weather presenters on the essential weather presentation skills. The result of this survey also supports the need for introducing courses for weather presentation training for journalists in the curricular of the WMO Regional Training Centres (RTCs). Due to the importance of having qualified people presenting, WMO could examine methodologies for instituting accreditation processes for journalists who wish to venture into the domain of weather presentation.

### 8.8 Media Support: Personnel

**Do you have specialised media liaison staff?**

**Do you provide media training to your forecasters?**

**Do you provide meteorological training to media presenters?**

**Do you provide meteorological training to media managers?**

The respondents were required to answer 'yes' or 'no' to the questions above.

#### Results

18 of the 33 NMHSs which responded to the questionnaire indicated that they did not have media liaison staff, while 15 NMHSs indicated that they did. 18 NMHSs indicated that they offered media training to forecasters. However, only 13 NMHSs were offering meteorological training to media presenters. 26 NMHSs indicated that they did not offer any meteorological training to media managers (Fig 15).

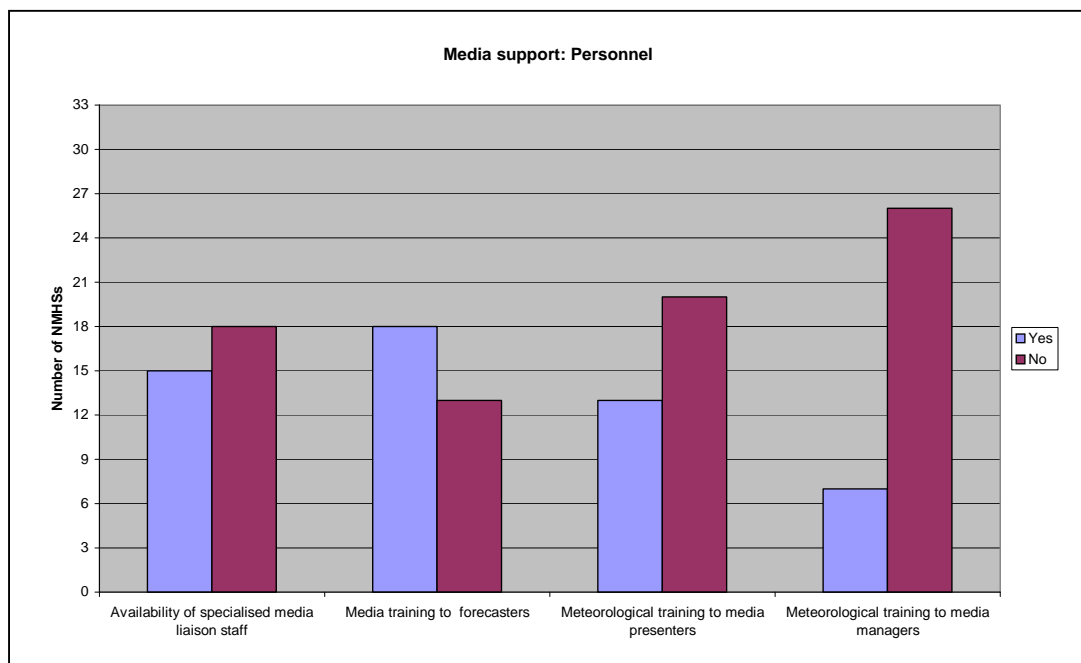


Fig 15: Training of media support personnel

## Overall remarks

The finding strengthens the need for WMO to enhance training of the media presenters and managers in aspects of meteorology relevant to their functions. The need to train managers on the importance of meteorological phenomena on social and economic issues of society makes media editors and sub-editors appreciate the need to encourage printing or airing of weather- and climate-related stories by their media. The presenters themselves need sufficient meteorological knowledge to help them appreciate the significance of the weather forecasts and warnings to the public. Training of Meteorologists to appreciate the constraints within which journalists operate and how to interest them in weather and climate issues, as well as on how to organize media events, is also of paramount importance to media liaison staff of NMHSs.

## 8.9 Media Support: Facilities

### Do you have on-site media facilities to assist TV/Radio in the provision of “on the spot reports & interviews?”

The question was meant to help in the assessment of the availability of media facilities in NMHSs for on-the-spot-reporting specifically: fully equipped TV studios; fully equipped radio broadcast booths; media rooms reserved for interviews; space provided for interviews; direct video links to TV stations and; direct audio links to radio stations.

## Results

18 to 24 NMHSs lack either all or some of the following amenities: fully equipped TV studios; fully equipped radio studio; media rooms and; direct links to TV and radio stations. However, 20 of NMHSs provided space for media interviews (Fig 16).

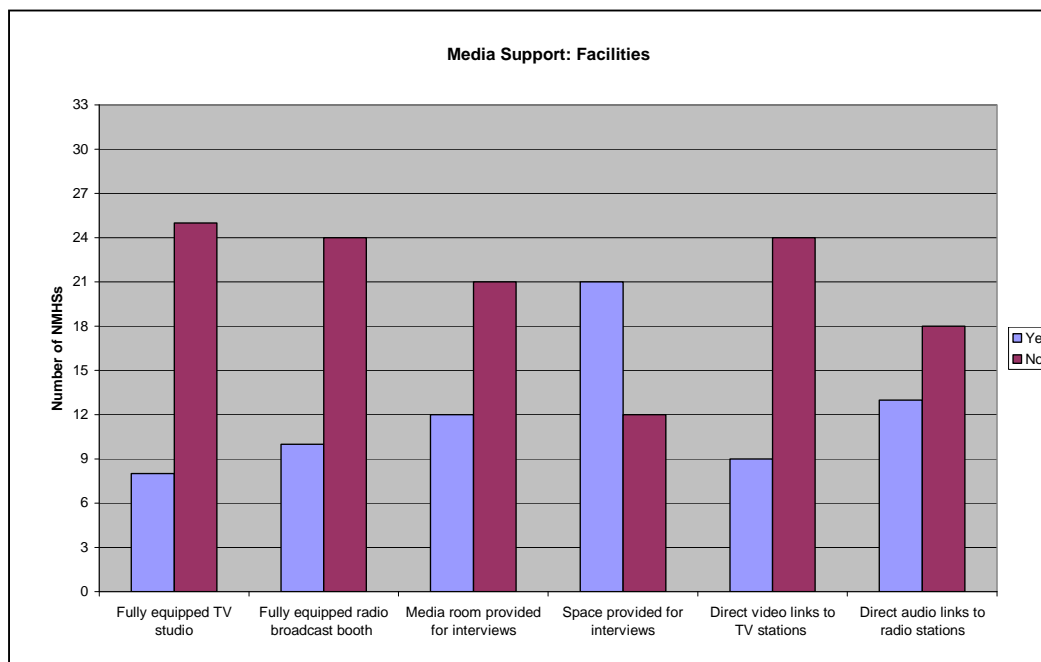


Fig 16: On-site media support facilities in NMHSs

**Overall remarks**

The majority of NMHSs did not possess fully equipped television or radio facilities. Neither did they possess links to television and radio stations which would facilitate live transmission of information from NMHSs to the public. Weather studios are very handy for the facilitation of public weather services and they render NMHSs very flexible in service delivery to multiple media organizations. Weather studios also make excellent training facilities for weather presentation training when the studios are not operationally engaged. Although they are not necessarily essential to service delivery, they present advantages that an NMHS may wish to consider having. It is therefore necessary for NMHSs to at least, consider equipping themselves with the facilities.



## 9. Key Stakeholders: Targeting Needs

**What new technologies or processes do you think you need to improve your services to Emergency Service or Media organisations? Have you received specific requests from these organisations?**

This question was meant to assist in identifying technologies and processes that NMHSs would wish to have at their disposal, in order to improve their delivery of service to ESOs and media organisations.

NMHSs indicated the following as their needs:

- Closer cooperation with emergency planners and managers;
- Technology for media presentation (graphics animation etc);
- Direct video links to TV Stations;
- Direct radio links to radio stations;
- Fully equipped radio broadcast booths;
- Operational video conferencing capabilities;
- Establishment of formal mechanisms for communicating with users and the public;
- Production facilities at all national and regional forecasting offices for TV media graphics;
- Online connectivity to TV channels;
- Web-casting capabilities;
- Direct radio broadcasting;
- GIS based forecasts and information;
- Training for media personnel to be presenters;
- Pager alert facilitation;
- Broad band Internet facilities;
- Satellite radio/data links between NMHSs and major stakeholders;
- Regular support for upgrading PWS delivery systems (TV studios, computers);
- Data processing systems;
- Fully equipped weather studio for radio and television;
- Video Conferencing facilities;
- Training for end-users;
- Improving telecommunications;
- Weather forecast and warnings dissemination through SMS;
- Better and more automated communications procedures;
- Better liaison with the emergency management communities;
- Planning meetings with emergency managers.

The following were identified as some of the requests that NMHSs have received from users:

- Emergency planners and managers have asked for closer cooperation with NMHSs;
- Increased frequency of communication with the media;
- Development of simplified language by NMHSs for use in communication of weather forecasts and warnings;
- Timely delivery of services to the media and emergency managers;
- Direct video links between NMHSs and TV and radio studios.

**Overall remarks**

There is a general recognition, by NMHSs, of the need for them to be able to process and package weather products for use by the radio, television and the print media. There is also recognised need for installation of direct communication links with media and emergency service organizations. The other outstanding feature of the responses is the recognised need for adoption of new technology and processes such as web-casts, SMS, video conferencing, GIS based forecasts and information in the delivery of services. The other stated need of NMHSs is training of meteorological staff in communication and in weather presentation, the media staff on relevant aspects of meteorology and in weather presentation. NMHSs also stated improvement of communication channels with disaster managers as an area that needs attention.

There is therefore need for WMO to focus on assisting NMHSs in the areas stated above.

**Appendix A.**

# Questionnaire

## **QUESTIONNAIRE ON IMPROVING THE DELIVERY OF PUBLIC WEATHER SERVICES**

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### **Introduction**

Every day of the year, people's lives are affected by weather and climate. Storms, floods, droughts and other extreme events frequently threaten safety of life and destroy property around the world. National Meteorological and Hydrological Services (NMHSs) have no greater responsibility than ensuring the safety of life, the protection of property and the well-being of their nations' citizens. Consequently, they must provide warnings and forecasts in a timely, reliable and comprehensive manner. Furthermore the forecasts and other information on weather- and climate-related events that the NMHSs provide are a vital component in the decision making processes for many weather-sensitive sectors, as well as for disaster management.

To help the NMHSs fulfil this task the World Meteorological Organization (WMO) in 1994 established the Public Weather Services Program (PWSP) as a part of its Applications of Meteorology Programme (AMP). The main purpose of PWSP is "to strengthen the capabilities of WMO Members to meet the needs of the community through provision of comprehensive weather services, with particular emphasis on public safety and welfare, and to foster a better understanding by the public of the capabilities of national Meteorological Services and how best to use their services"

### **Assisting NMHSs With Limited Resources**

Many nations lack the resources to provide a thorough public weather services program. It is sometimes necessary for the NMHSs to make compromises to provide the best possible service within the constraints of the budget they are allocated. In situations, where the NMHS may be somewhat isolated from the international meteorological community, decisions on the most effective use of resources may not be based on the best information available. Similarly those NMHSs may not be using resources to their maximum potential

There are often opportunities for the international community to provide assistance to NMHSs in developing countries to build the capability to more effectively use the resources available. The sources of help include the various WMO groups and teams of experts, other NMHSs and external international funding and aid agencies with which the WMO has links.

## **New and Improved PWS for Key Stakeholders**

For public weather services to have the greatest impact on the community, the message has to be delivered to the appropriate sections of the community in an effective way. To achieve this, the NMHSs must work with key stakeholders in the community. Of particular importance is the effective delivery of critical warnings information to the emergency services and other authorities who need to react to the threat. The delivery of observations, forecast and warning products to all parts of the community requires the services of media organisations. Improving the delivery of information to these key stakeholders is critical to an effective service.

At the same time, there are new and emerging opportunities and technologies that are allowing organisations to better communicate data and information with each other. As organisations embrace this change, more efficient and effective service delivery often results, however to make this change there is often research that must be done beforehand. Much of this is being duplicated as organisations around the world sometimes pursue similar goals in isolation. Some NMHSs do not have the resources to effectively evaluate various technologies that may be presented to them, meaning that the optimal decision is likely to be overlooked.

The PWSP aims to provide information on what is being done around the world, so that where needed, NMHSs can obtain information on where they can take advantage of technologies that exist within the global meteorological community. This will allow them to make more informed decisions to improve the service they provide to their community.

## **The Survey**

To help the WMO and PWSP to facilitate targeted assistance to NMHSs, it is first necessary to understand the scope and nature of the problem that exists. To this end, the CBS OPAG on PWS tasked its **Expert Team on Services and Products Improvement (ET/SPI)** to conduct a survey to gather the required information to help address the issues presented above.

## **Main Purposes of this Survey**

The purposes of the current survey are two-fold as described below:

- To assess the needs of NMHSs in developing countries regarding the PWS programme with a focus on identifying opportunities to improve products and services
- To identify the emerging needs for new and improved PWS products and services for the emergency management community and media partners

# Questionnaire

## Authority:

Is there a formal arrangement for the provision of PWS between your NMHS and Government? (i.e. are there defined deliverables that are required of the NMHS)					
<i>Circle</i>	None	Very Little	Limited	Extensive	Complete
<i>Answer</i>	1	2	3	4	5

## Availability:

Do you provide a full time Public Weather Service?	
<i>Tick Box</i>	Full-Time 24/7 <input type="checkbox"/> Part Time <input type="checkbox"/> Emergency response only <input type="checkbox"/>
	<i>If part time, please state coverage period:</i>
	_____
	_____
	_____

## Observations:

Do you have access to the following observational data to support your Public Weather Service?				
Observation Type – <i>tick boxes</i>	None	Limited	Adequate	Plenty
Standard synoptic met data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper air data (wind)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper air data (temp/moisture)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satellite imagery (standard IR/Vis/WV)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satellite extras (microwave scatterometer SST etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ozone upper atmosphere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surface UV/ Solar Radiation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radar: Reflectivity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radar: Doppler	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radar: Dual Polarisation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hydro: Rainfall amounts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hydro: River heights	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hydro: River flow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marine: Tide Gauges	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Marine: Tsunami Monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oceanographic: Buoys/Ships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oceanographic: Sub-surface	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Specialised Data:**

Do you have access to the following value-added data to support your Public Weather Service? Where is it obtained?								
Data	Amount				Source			
	None	Limited	Adequate	Plenty	In-house	Your Nation	Other NMHS	Inter-national
NWP (Global)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NWP (Regional)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NWP(Meso-scale) What resolution? _km	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climatological records	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Technical Resources:**

Do you have access to the following technical resources to support your Public Weather Service?				
System	None	Limited	Adequate	Plenty
Continuity of Utilities (electricity, etc) <i>status of national infrastructure</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communications: Phone/Fax	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incoming:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dissemination:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communications: Internet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incoming:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dissemination:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communications: GTS, Data-links	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Incoming:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dissemination:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General computing infrastructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hardware:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Software:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Meteorological Workstations for visualisation and product generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Other physical resources:**

Do you have access to the following basic resources to support your Public Weather Service?				
System	None	Limited	Adequate	Plenty
Basic Stationery (paper, printer ink, etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utilities (ability to pay)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Observing consumables (eg balloons, radiosondes)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical spare parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation between offices & stations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



**Public Weather Service: Methods of dissemination:**

Via what methods do you provide public weather services:			
	None	Limited	Extensive
Media: TV	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broadcast TV (Free of Charge): Cable or Satellite Subscription:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Media: Radio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
National Radio: Commercial Radio:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet: Web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
NMHS web page: Third-party web page:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet: Email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet: Other technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Telephony:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Fax	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• SMS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Other mobile technologies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Telex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Specialised technologies:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Sat-phone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• RANET	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Marine Radio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Inmarsat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Other ( _____ ) <i>insert type</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Through Third Party Service Providers:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Government	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Commercial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>list</i> )			



**Public Education Program:**

What methods do you use to provide information to the public about your Public Weather Services program?			
	None	Limited	Extensive
Brochures & Pamphlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Internet: Information pages on the Web	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
School Curriculum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Primary:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Secondary:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tertiary:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TV/Radio Advertising	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Newspaper Advertising	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public Meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information Booths at Trade or Agricultural Shows	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Targeted Key Stakeholder Meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other ( <i>please list</i> )			

**Priorities**

*These are the key areas that have been identified from earlier surveys:*

Please rank them in order of priority for your NMHS where you need help to improve your PWS programme. You may include an extra item of your choice if you feel we have omitted an issue that is of special concern to you  
(1 – most important to 12 – least important)

<i>Issue</i>	<i>RANK</i>
Capacity Building (Forecast accuracy; Products; Preparation and presentation of media material)	
Computer Hardware & Software	
Communication with the Public (effective product delivery)	
Public Education	
Research and Linking with Institutes and Agencies	
Training	
Enhancing Warning Services	
Coordination with Disaster Management Agencies	
Opportunities for Combining Resources and Operations with Other Agencies or Adjacent Countries	
Threat from Commercial Meteorological Service Providers	
Development of Applications in Nowcasting	
Other: <i>Please Describe:</i>	

### Quality Management Procedures

Have you had any experience of QM procedures?	Yes <input type="checkbox"/> Limited <input type="checkbox"/> No <input type="checkbox"/>
Do you have QM procedure in place?	Yes <input type="checkbox"/> Limited <input type="checkbox"/> No <input type="checkbox"/>
Have you considered implementation or improvements?	Yes <input type="checkbox"/> No <input type="checkbox"/>
If so has the recently distributed WMO document: WMO/TD No 1258 influenced your decision	Yes <input type="checkbox"/> No <input type="checkbox"/>
Will you use this document to assist you in the future?	Yes <input type="checkbox"/> Maybe <input type="checkbox"/> No <input type="checkbox"/>

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### *New and Improved PWS for Key Stakeholders*

This section of the questionnaire will focus on the provision of public weather services to two key stakeholders:

- ❖ Emergency Service Organisations
- ❖ Media

### Emergency Service Organisations: PWS provided

Which Emergency Services Organisations do you provide direct information to? <i>Tick boxes</i>				
	Warnings	Routine Forecasts	Observations	Face-to-Face Liaison
Police	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ambulance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Search & Rescue	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Civilian ES Organisations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Military	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Emergency Services: Official Arrangements

Is there a formal arrangement for the provision of PWS between NMHS and Emergency Service Organisations?	
Yes <input type="checkbox"/>	With Whom? _____ _____ _____
No <input type="checkbox"/>	





**Media: Products**

Does your media provide regular and/or special broadcasts?					
Medium	Product Type	None	Regular	Special	Both
TV	Warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Forecasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Observations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio	Warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Forecasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Observations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Press	Warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Forecasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Observations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Media: Data Formats**

Do your media provide presentations in the following formats – and where is the formatting done?					
Medium	Product Type	None	NMHS	Media	Third Party
TV	Text/Voice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Graphics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Animations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Press	Text	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Graphics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Media: Presenters**

Do your media use NMHS staff or presenters who are fully trained in meteorology?					
Medium	Presenters	None	Few	Many	All
TV	NMHS Staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Met. Trained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Untrained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio	NMHS Staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Met. Trained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Untrained	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Media Support: Personnel**

Do you have specialised media liaison staff?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Do you provide media training to your forecasters?	Yes <input type="checkbox"/> No <input type="checkbox"/>

Do you provide meteorological training to media presenters?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Do you provide meteorological training to media managers?	Yes <input type="checkbox"/> No <input type="checkbox"/>

### Media Support: Facilities

Do you have on-site media facilities to assist TV/Radio in the provision of “on the spot reports & interviews”	
Fully equipped TV studio	Yes <input type="checkbox"/> No <input type="checkbox"/>
Fully equipped radio broadcast booth	Yes <input type="checkbox"/> No <input type="checkbox"/>
Media room provided for interviews	Yes <input type="checkbox"/> No <input type="checkbox"/>
Space provided for interviews	Yes <input type="checkbox"/> No <input type="checkbox"/>
Direct video links to TV stations	Yes <input type="checkbox"/> No <input type="checkbox"/>
Direct audio links to radio stations	Yes <input type="checkbox"/> No <input type="checkbox"/>

### Key Stakeholders: Targeting Needs

What new technologies or processes do you think you need to improve your services to Emergency Service or Media organisations?	
<i>List:</i>	
Have you received specific requests from these organisations?	Yes <input type="checkbox"/> No <input type="checkbox"/>
<i>List:</i>	

Thankyou for your patience in completing this survey.

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