

# **Taking Action Through Pilot Projects Within PWS: “Learning Through Doing”**

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## **Abstract**

*Through the work of the Public Weather Service (PWS) Programme of the WMO over the years, much knowledge has been accumulated in various aspects of PWS and spread to Members through conventional training methods such as workshops, conferences, and publication of guidelines. However, some Members, particularly developing countries including Least Developed Countries, still find themselves ineffective in dealing with challenges in PWS brought by rapid urbanization, economic globalization, environmental degradation, natural hazards, and the threats from climate change.*

*To assist these Members in enhancing their PWS capabilities, the PWS OPAG initiated a new thrust by embarking on Pilot Projects based on the concept of “Learning Through Doing”. The idea is that the PWS OPAG will select a small group of countries, and arrange for mentoring agents to work alongside the staff of the relevant NMHSs in assisting them to improve their communication with users in selected target sectors, and to develop and deliver an improved range of products and services which would enhance the socio-economic benefits provided through the NMHSs to Members. Details of the realization of such Pilot Projects, including the planning, implementation and review processes, are described in the paper.*

## **Introduction**

The Public Weather Service (PWS) Programme of WMO was established in 1994 with a view to “strengthening 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 and Hydrological Services (NMHSs) and how best to use their services”. The PWS provides a window through which the NMHS communicates weather warnings and forecasts to the public.

In recent years, rapid urbanization, economic globalization, environmental degradation, natural hazards, and the threats from climate change have posed great challenges to Members and their public weather services. Unfortunately, some NMHSs, especially those from developing countries including Least Developed Countries (LDC), are playing catching-up on such fast development trends and simply emerging as ineffective service agents, poorly equipped

to deal with the capabilities and skills required for successful modern-day PWS. This highlights the widening polarity of capacities between the developed and less developed NMHSs; hence the need for urgent action on the part of the Public Weather Services Programme (PWSP).

This paper reviews the achievements of the PWSP in the last decade, highlights some of the recent developments impacting PWSP, examines shortfalls in the current PWSP capacity building strategies and explores the way forward to enhance the PWS capabilities of Members.

## **Achievements of the PWS Programme (PWSP)**

PWS is one of the Open Program Area Groups (OPAG) under the overall responsibility of the Technical Commission for Basic Systems. The work of PWSP is coordinated through an Implementation Coordination Team (ICT) and its expert teams. In 1999, two Expert Teams, namely Media Issues; and Product Development, Verification and Service Evaluation were formed to bring out the areas of focus. In 2002, the

latter was re-structured as Product Development and Service Assessment and a third Expert Team on Warnings and Forecasts Exchange, Understanding and Use was added. The third team was subsequently restructured as the Expert Team on PWS in Support of Disaster Prevention and Mitigation. The scope of work of the expert teams has now expanded from media to communication including public education and awareness; from product development and assessment to application of new communication technology for product delivery, probabilistic forecasts, and workstation development for product and service improvement; and from exchange and utility of warnings into early warning systems, nowcasting and disaster risk reduction functions.

Over the years, the ICT through its expert teams put together a mass of knowledge in different PWS aspects and produced guidelines on recommended practices, producing success stories and best practices in various areas including: standard framework for data and products, graphical presentation of products; application of research, biometeorology and air quality forecasts; quality management procedures and practices; performance assessment, application of Internet and other new technology; weather broadcast and the use of radio for the delivery of weather information; media relations and ensuring the use of official consistent information; capacity building strategies; public education and outreach strategies; improving public understanding of and response to warnings; cross-border exchange of warnings; and integrating severe weather warnings into disaster risk management. A list of the guidelines published is given in Appendix I.

These guidelines are published and distributed to NMHSs for their reference and use. They are also made readily available on the WMO web site. From time to time workshops and seminars were arranged on topical issues, to spread the latest knowledge, technological know-how and share experience.

A significant milestone in the PWSP is the development and operation of two international web-based projects, namely, the World Weather Information Service (WWIS) and Severe Weather Information Centre (SWIC). The WWIS (<http://worldweather.wmo.int/>) is operated by China (Chinese version), France (French version), Hong Kong, China (English version), Macao, China and Portugal (Portuguese version), Oman (Arabic version) as well as Spain (Spanish version) for providing official weather forecasts, as well as climatological information from Members to the public and media round the world. By September 2007, there are 116 WMO Members supplying weather forecasts to WWIS covering a total of 1,218 cities. Furthermore, 160 Members are providing climatological information for 1,223 cities to WWIS. The total page visits for all 6 WWIS language

versions reached 71 million in the first 9 months of 2007.

The SWIC (<http://severe.worldweather.wmo.int/>) is operated by Hong Kong, China providing official warnings from Members to the public and media worldwide. The page visits to the SWIC website amounted to some 10 million visits in the first 9 months of 2007. Besides providing a source of weather and warning information to meet the needs of the global community, these two websites also serve to promote the image of NMHSs, especially, those of developing Members,

### **The WMO Madrid Conference and Madrid Action Plan**

The WMO International Conference on 'Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services' took place in Madrid, Spain from 19-22 March 2007. The purpose of the Conference was to contribute to secure and sustainable living for all the peoples of the world by evaluating and demonstrating, and thence ultimately enhancing, the social and economic benefits of weather, climate and water services. The Conference endorsed a Madrid Action Plan (Appendix II) with the overall objective of achieving, within five years, a major enhancement of the value to society of weather, climate and water information and services in response to the critical challenges represented by rapid urbanization, economic globalization, environmental degradation, natural hazards, and the threats from climate change.

The Actions from the Madrid Action Plan that have direct relevance to the mandate of the PWSP are highlighted in italics in Appendix II. In short, the main recommendation is that NMHSs would need to enhance their efforts to make potential users – including their governments – aware of the range of products and services, including potential new products and services, and their expected benefits for users. This should lead to a dialogue with the users so that the users can specify their requirements and respective service level agreements can be concluded to maximize the benefits provided by the meteorological and hydrological community.

As part of the process leading up to the Madrid Conference, a series of seven regional and sub-regional preparatory workshops was organised by WMO over the period November 2005 to February 2007 in the Philippines, Mali, Brazil, Kenya, Tanzania, Kuwait and Croatia. The principal goal of the preparatory workshops was to provide a forum for promoting interdisciplinary assessment of socio-economic benefits of meteorological and hydrological services involving service providers and different users. The workshops identified regional common issues and national specific differences and noted the following areas of concern:

- (i) Inadequate understanding of user needs and requirements for meteorological and

- hydrological information and services by NMHSs;
- (ii) Lack of awareness of users on the available and potential weather, climate and water services in developing countries, in particular the LDCs;
  - (iii) The difficulty of integrating weather, climate and water services into national development strategies and priorities including those related to the Millennium Development Goals (MDGs);
  - (iv) Lack of capacities and specialized competencies in NMHSs of developing countries to deliver timely and relevant services in order to better meet the needs of users; and
  - (v) Inadequate communication between NMHSs and users.

The workshops made general and more focused recommendations as follows:

- (i) To integrate the outcomes of the regional workshops into the various strategic plans of Regional Associations;
- (ii) To organize national workshops to define appropriate processes for quantitative evaluation of the socio-economic benefits of meteorological and related services including the development and implementation of pilot demonstration projects and sharing good practices and experiences;
- (iii) To establish appropriate partnerships between various stakeholders, in particular providers and users;
- (iv) To organize capacity building initiatives including training both providers and users to facilitate better delivery of meteorological and related information and products;
- (v) To develop the capacities of NMHSs in marketing and communication; and
- (vi) To address emerging needs of users including climate change related issues.

These recommendations are of direct relevance to the PWSP.

### **Shortfalls in Existing PWSP Capacity Building Strategies**

Conventional training methods such as workshops, conferences and symposiums have been the key capacity building activities of the PWSP to address some of the institutional, organizational and individual skill needs of Members in the delivery of their public weather service. Although in recent years there is a shift to strengthen the impact of training by focusing more on specific organizational outputs and outcomes such as “train-the-trainer” approach, most training activities are unfortunately still delivered as isolated, one-off events with a focus on training isolated groups or individuals

who may not be in a position or have a holistic view to effect change within an organization. New strategies are required to achieve long-term and sustainable effects in building the capacity of these Members.

Publication of PWS guidelines is an effective means for transfer of knowledge and sharing of experience amongst Members. Although much work has been done by the ICT in publishing PWS guideline documents, there is no real measure of the extent to which they have been used, and the knowledge contained within them applied, by NMHSs.

Furthermore, some NMHSs could not benefit as much as they should from the published guidelines in bringing about significant improvement in their PWS. This may be attributed to great inertia of the existing structure and practices which resist changes. There may be a need for some fundamental changes in respect of some Members before they can progress on the PWS front. Nevertheless, there is increasing awareness that some of the processes are social in nature which must be learned by practice, and consciously acquired over time by those who are engaged in it.

These shortfalls of existing capacity building strategies in PWSP clearly highlight the need for a new approach that goes beyond the conventional.

### **A New Approach: “Learning Through Doing”**

An eminent psychologist, Carl Roger (as cited in Kraft, 1978), asserted that “The only learning which significantly influences behaviour is self-discovered, self-appropriated learning.” (as cited in Kraft, 1978). Learning cannot be imposed. It can only be acquired through participation. Hence, the name of the non-conventional approach: “Learning Through Doing”.

In “Learning Through Doing”, the participant will learn through a combination of action and reflection. The approach is participation oriented and outcome focused, with development of partnership and ownership as an important component. This approach consists of a series of learning cycles, each comprising phases of planning, action, feedback and reflection. A cycle starts with an issue, which becomes the learning motivation. The next step is to analyse the situation and make assumptions based on prevailing situation. Based on these assumptions, a plan with input from all stakeholders would be prepared, to be followed by action accordingly. The outcome of the actions will be reviewed and lessons learnt identified. This then forms the basis for verification and/or further refinement of the assumptions, leading to the next learning cycle. The “Learning Through Doing” approach is illustrated schematically in Figure 1.

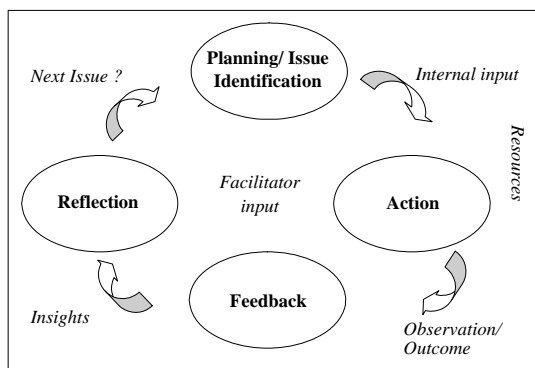


Figure 1: The “Learning Through Doing” Approach

The main characteristics of this approach are:

- (i) learning through participation;
- (ii) reflection on action aiming to check the validity of the basic assumptions, thus leading to knowledge which can be applied and tested in future learning cycles;
- (iii) collaboration and participation of various stakeholders;
- (iv) existence of an external change agent that would enable the creation of a learning environment for the participants and facilitate resourcefulness; and
- (v) capacity building of various stakeholders is an important component of the approach in order to achieve long-term and sustainable effects.

The elements conducive to successful outcomes of this approach are:

- (i) recognition of the inherent capacity, capabilities and knowledge within the participating organizations and the strengthening or enhancing of this rather than building new capacity;
- (ii) the development of trust based on honest, transparent and accountable relationships;
- (iii) a long-term commitment to the process of engagement, participation and shared learning where mistakes are considered openly, reflected upon and built upon;
- (iv) tangible benefits for the participating organizations;
- (v) the development of commitment and a supportive enabling environment at all levels;
- (vi) skills, knowledge and adequate capacity at the organization level supported by sound leadership and mentoring processes to build and enhance capacity where it has been identified as limited or weak; and
- (vii) ownership.

In contrast to conventional learning, the “teacher” as a change agent supports the evolution by assessing, intervening, observing and evaluating the process. Its role is not to “educate” participants, rather it is to facilitate their development by bringing people together to learn from each other by sharing experiences to face common problems and develop solutions together. One of the best sources of relevant change agent is from peers who are experienced in actually leading major efforts themselves. On-going actions, feedback, and reflection provide opportunities for continuous problem solving and learning for participants.

It is only when participants buy-in the training and incorporate the insight gained into their knowledge base could the learning effect be long-lasting and sustainable. A major course of action critical to the success of the “Learning Through Doing” approach is thus the creation of ownership. Participants must take on the responsibility for developing their own capacities, and therefore ownership of the change. Nevertheless, it is only when participants believe that an activity is in their best interest, and provides tangible benefits within acceptable costs will they then consider ownership.

Using the approach of “Learning Through Doing”, it is possible to design an effective PWS capacity building programme which would focus on continuous, adaptive and interactive learning to enable participants appreciate and manage their changing circumstances and to enhance their abilities to identify and meet development challenges in a sustainable manner.

### **New Thrust of the PWSP: WMO Pilot Project – “Learning Through Doing”**

In order to ensure that, in so far as possible, those on the front line of delivering services in NMHSs could benefit from the advice and guidance in PWS which have been collected and published, the ICT considers that the PWS OPAG should embark on a coordinated training and mentoring programme which would focus on “Learning Through Doing”. The objective of the programme is to assist developing Members, through learning-by-doing, and through maximizing their existing capabilities, to make potential end-users aware of the range of both available and potential new products and services, and the likely benefits for users. The idea is that the PWS OPAG will select a small group of neighbouring countries, and arrange for mentoring agents to work with the staff of the relevant NMHSs in assisting them to improve their communication with users in a defined range of sectors, and to develop and deliver an improved range of products and services which would enhance the socio-economic benefits provided through the NMHSs to Members. It is proposed that the programme would start off with Pilot Projects, each with duration of 2 to 3

years, involving a small number of Members to test out the concept, before the methodology is widely applied. In the process, the programme will draw on the expertise available through the ICT's expert teams as well as that provided through the Secretariat.

A Pilot Project would comprise three stages, namely the Planning, Implementation and Review stages, as described below:

### **(I) Stage I: Planning**

The ICT assisted by the Secretariat would first identify suitable Members with a common need (e.g. enhancement of early warning system for tropical cyclones) to participate in the Pilot Project. In order to be a candidate, its NMHS should have an operational forecast office and produce a basic suite of products and services. It should have a demonstrable level of commitment in terms of infrastructure and support from the management. The target user sector such as agriculture, health, emergency response etc would also need to be identified early, ensuring that client partners can be found. Findings from relevant studies in the past may be useful at this stage. The ICT would identify suitable experts as mentoring agents at various stages required in the Pilot Project. Working language of the Pilot Project would be agreed by both mentors and recipient Members. Ideally, co-operation of the relevant RSMC or a regional coordination centre would be sought to assist with access to products that may be essential for the Project. To benefit from the economy of scale and for establishing regional networks, two to three Members from the same region would participate in the Pilot Project, so that expertise and experience may be shared. The Secretariat, in consultation with participating Members, would finalize a project proposal, including definition of project scope, duration, milestones and deliverables, for seeking project funds if necessary. Formal agreement would be signed between participating Members and the WMO Secretariat (and funding agencies, if any) before going into implementation. The project proposal and funding agreement, if applicable, would constitute the key deliverables for this stage.

### **(II) Stage II: Implementation**

At this stage, mentoring agents selected by the ICT should act as resource agents and facilitate staff of the participating Members in accomplishing the goal of the Pilot Project. An initial market survey in the selected Members to benchmark the NMHS brand would be conducted to determine if the selected sectors are aware of and use the products and services of the NMHS. Methodology for socio-economic assessment of

target sectors would then be established and the baseline impact of the existing set of meteorological products and services clarified. The NMHS would engage the target sector in dialogue in a systematic manner, to reveal the gaps between user requirements and the NMHS's current capability, which are addressable, taking into account the macro environment faced by the NMHS's and by making use of the knowledge database accumulated so far in the PWS community. The results would be translated into a business plan for the participating NMHSs in dealing with the target sectors, with improvements in PWS through (i) new or enhanced products; (ii) use of new technology in service delivery; (iii) more effective communicative skills and means; and (iv) more public education and outreach.

The business plan would be put into action and the outcome monitored. A systematic way to monitor the outcome would be set up. A workshop would be organized to share experiences and knowledge with the NMHSs in the same region. The initial market survey report, criteria and methodology for the assessment of economic benefits of the target sectors, the business plan, outcome monitoring plan as well as the organization of the experience-sharing workshop would be the key deliverables of the Implementation Stage.

### **(III) Stage III: Review**

After the execution of the business plan, a post-project survey to assess impact of the improved PWS would be conducted. Enhanced capacity of the NMHS, improved products and more efficient service delivery are useful indicators. The overall evaluation should use as basis the benchmark brand of the NMHS and the baseline social and economic impact, established earlier. Suitable ICT experts may also be called in at this stage to facilitate the overall evaluation and reflection by participating Members. The post-project survey and overall evaluation reports would be the key deliverables of this stage.

A cost-effective way to actualize the idea of "Learning Through Doing" would be by injecting some PWS aspects, through cooperation with various OPAGs, into other existing WMO programmes or projects. One potential candidate is the Severe Weather Forecasting Demonstration Project RAI South-Eastern Africa which has room for enrichment by adding a PWS element involving media and disaster management and a nowcasting element. It is proposed that the PWSP should develop opportunities in this direction and identify potential projects which have room for enrichment by adding various PWS elements.

It is hoped that with the help of the Pilot Project, participating Members would start up their learning cycles facilitated by 'mentoring agents' through their own live action in a familiar environment. As a result, the solutions emerged in dealing with target issues would be more relevant and hence more effective. During the process, the impact of expert knowledge in the field through improved PWS could be evaluated in a systematic manner. The process of issue identification, action, feedback and reflection would continue into new learning cycles after the Pilot Project, enhancing the capabilities of participating Members to meet development challenges in future.

## References

1. Final Report of the Meeting of the CBS OPAG/PWS Implementation Coordination Team, Muscat, Sultanate of Oman, 4-9 June 2007.
2. Report of the First Meeting of the Task Force on Socio-Economic Applications of PWS, Geneva, Switzerland, 15-18 May 2006
3. Report of the Second Meeting of the Task Force on Socio-Economic Applications of PWS, Geneva, Switzerland, 11-13 July 2007.
4. Madrid Conference Statement and Action Plan, WMO, 2007  
([http://www.wmo.int/pages/themes/wmoprod/documents/madrid07\\_ActionPlan\\_web\\_E.pdf](http://www.wmo.int/pages/themes/wmoprod/documents/madrid07_ActionPlan_web_E.pdf))
5. R.G. Kraft. "Bike Riding and the Art of Learning". *Change*, X(6):36,40-42, Jun./Jul. 1978.

**Appendix I**

**Published Guidelines on PWS**

1385	Guidelines on capacity building strategies in Public Weather Services (PWS-15)
1354	Strategy for Developing Public Education and Outreach (PWS-14)
1292	Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management (PWS-13)
1278	Guidelines on Weather Broadcasting and the Use of Radio for the Delivery of Weather Information (PWS-12)
1256	Guidelines on Quality Management Procedures and Practices for Public Weather Services (PWS-11)
1184	Guidelines on Biometeorology and Air Quality Forecasts (PWS-10)
1179	Guidelines on Cross-Border Exchange of Warnings (PWS-9)
1139	Guide on Improving Public Understanding of and Response to Warnings (PWS-8)
1103	Supplementary Guidelines on Performance Assessment of Public Weather Services (PWS-7)
1102	Guide on the Application of New Technology and Research to Public Weather Services (PWS-6)
1100	Public Weather Services in Region VI (Europe) - Report of Survey (PWS-5) (PDF format)

**Appendix I (cont'd)**

**Published Guidelines on PWS**

1080	Guidelines on Graphical Presentation of Public Weather Services Products (PWS-4)
1088	Guidelines on the Improvement of NMSs - Media Relations and Ensuring the use of Official Consistent Information (PWS-3)
1084	Weather on the Internet and Other New Technologies (PWS-2)
1054	Technical Framework for Data and Products in Support of Public Weather Services (PWS-1)
1023	Guidelines on Performance Assessment of Public Weather Services

## Appendix II

### THE MADRID ACTION PLAN

#### The WMO Madrid Conference Statement and Action Plan (MAP)

The International Conference on 'Secure and Sustainable Living: Social and Economic Benefits of Weather, Climate and Water Services' organized by the World Meteorological Organization (WMO), took place in Madrid, Spain from 19-22 March 2007. The purpose of the Conference was to contribute to secure and sustainable living for all the peoples of the world by evaluating and demonstrating, and thence ultimately enhancing, the social and economic benefits of weather, climate and water services.

As part of the process leading up to the Madrid Conference, a series of seven regional and sub-regional preparatory workshops organised by WMO over the period November 2005 to February 2007 in the Philippines, Mali, Brazil, Kenya, Tanzania, Kuwait and Croatia. The principal goal of the preparatory workshops was to provide a forum for promoting interdisciplinary assessment of socio-economic benefits of meteorological and hydrological services involving service providers and different users. The workshops identified regional common issues and national specific differences and noted the following areas of concern :

- (i) Inadequate understanding of user needs and requirements for meteorological and hydrological information and services by NMHSs;
- (ii) Lack of awareness of users on the available and potential weather, climate and water services in developing countries, in particular the Least Developed Countries (LDCs);
- (iii) The difficulty of integrating weather, climate and water services into national development strategies and priorities including those related to the Millennium Development Goals (MDGs);
- (iv) Lack of capacities and specialized competencies in NMHSs of developing countries to deliver timely and relevant services in order to better meet the needs of users; and
- (v) Inadequate communication between NMHSs and users.

The workshops made general and more focused recommendations as follows:

- To integrate the outcomes of the regional workshops into the various strategic plans of Regional Associations;

- To organize national workshops to define appropriate processes for quantitative evaluation of the socio-economic benefits of meteorological and related services including the development and implementation of pilot demonstration projects and sharing good practices and experiences;
- To establish appropriate partnerships between various stakeholders, in particular providers and users;
- To organize capacity building initiatives including training both providers and users to facilitate better delivery of meteorological and related information and products;
- To develop the capacities of NMHSs in marketing and communication; and
- To address emerging needs of users including climate change related issues.

The Conference agreed that NMHSs need to enhance their efforts to make potential users – including their governments – aware of the range of products and services, including potential new products and services, and their expected benefits for users. This should lead to a dialogue with the users so that the users can specify their requirements and respective service level agreements can be concluded.

(The Actions from this Plan (MAP) that have direct relevance to the mandate of the PWSP are highlighted in italics.)

**Action 1:** Review the institutional framework governing meteorological and hydrological service provision in order to strengthen partnerships with different sectors of the economy.

**Action 2:** Lead a quantum change in the way that weather, climate and water information and services are produced, used and communicated by identifying, confirming and responding to the rapidly increasing and evolving needs of multi-disciplinary stakeholders for appropriately timed and scaled weather, climate and water information and services.

**Action 3:** *Embark on capacity building endeavours through creation of education and training opportunities for both users and providers of weather, climate and water information to increase awareness of users to the opportunities afforded by weather, climate and water services, and to assist the providers of these services to understand more fully user requirements.*



**Action 4:** Foster increased recognition by governments and other stakeholders of the contribution that NMHSs and their partners are making to secure and sustainable living.

**Action 5:** Adopt the following steps to meet the growing demand for weather, climate, water and related information and services:

- strengthening of observational programmes, and the associated research and development;
- development of the next generation of climate and earth system models with resolutions of 10 km or finer, and the corresponding data assimilation systems;
- significantly strengthening multidisciplinary research programmes required to develop the understanding underpinning the development of these models; and
- improving delivery and distribution systems, including early warning systems, to allow NMHSs to meet the needs of institutions, agencies and the general public; consolidating existing and, when appropriate, creating new regional operational centres to mutualise competencies and resources; and

**Action 6:** Develop analysis of the urban environment as a critical ecosystem requiring targeted observation, research and meteorological and hydrological services.

***Action 7:** Facilitate and strengthen dialogue and collaboration between providers and users of weather, climate and water information and services through international, regional and national platforms and programmes, and through the development of appropriate tools and methods.*

**Action 8:** Strengthen existing, and develop and implement new, multi-disciplinary programmes that will define and improve ways and means to generate and deliver those weather, climate, and water services, which address the developmental, societal, economic, environmental and health concerns of the countries.

***Action 9:** Strengthen existing, and establish new, operating partnerships between users and providers of weather, climate and water services to share responsibility for effective delivery of services, and evaluate their performance.*

***Action 10:** Facilitate and strengthen the ability of NMHSs to effectively communicate weather services and products, through all forms of media, in such a manner as to maximize the benefits provided to society by the meteorological and hydrological community.*

***Action 11:** Encourage the NMHSs and social science research community to develop knowledge and methodologies for quantifying the benefits of the services provided by NMHSs within the various socio-economic sectors; in particular:*

- *develop new economic assessment techniques including especially techniques of economic assessments for developing and least developed countries;*
- *develop WMO Guidelines on operational use of economic assessment techniques;*
- *train national staff on use and practical application of economic assessment of the benefits of services provided by NMHSs;*
- *present results of economic assessments to governments and donors/International Financial Institutions with the goal of modernizing the infrastructure of NMHSs and strengthening their service delivery capacity.*

**Action 12:** Encourage the free and unrestricted exchange of meteorological, hydrological and related data to support research and improve operational services.

**Action 13:** Build on the earlier WMO work on the development of a comprehensive economic framework for meteorological service provision.

**Action 14:** Develop, as a matter of urgency, the implementation plan to give effect to the actions set out above.

**Action 15:** Monitor and report every year to key partners on progress with the implementation plan, and organize a further, more broadly based, conference in 5 years to take stock of achievements under this Action Plan.