IFMS NEWSLETTER

International Forum of Meteorological Societies

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Articles in this Issue:

Preamble from IFMS President

IFMS Collaboration

IFMS -Assessing in Capacity Building through Education and Training

Capacity Building Against GWE & CC

Cyclone Warning Services

Announcing the Formation of South Asian Meteorological Association (SAMA)

Building Capacity by Creating NMSocs & RMSs

Awards and Prize Winners announced by RMetS

Climate Services in Asia Pacific

Disaster Management and IFMS

Creation of African Meteorological Society

Reports:

Report on Summit of Africa on December 10 2020

Report on IMS Annual Symposium TROPMET

Preamble by IFMS President

Dr. Harinder Ahluwalia

I would like to start this message by wishing our Newsletter readers a Happy New Year and relief from COVID-19. I encourage you to get vaccinated as soon as possible to protect yourself and your families but still take precautions and contribute to the end of the pandemic.

The past year has been a challenge for almost every country and has taught us a lesson to be prepared for pandemics and natural disasters; otherwise, if not handled properly, the suffering can be compounded several folds. We have seen over at least the past few decades increasing atmospheric warming and an increase in the frequency and cost of recovery from severe weather. Safeguarding society involves adaptation and mitigation action to reduce the threat. Building capacity in the services provided by the Global Weather Enterprise needs to be a part of that action.

Creating this capacity means advancing weather forecasting and warning capability worldwide – with all countries possessing the necessary infrastructure, service capability and institutional and societal capacity. National Meteorological Societies (NMSocs) can make strong contribution in a part of this advancement. They can assist in Education and Training (E&T) Programs not only for weather forecasters, but also for ensuring governments and the public appreciate the growing threat and how investment in improved weather information can improve mitigation and adaptation to a changing environment.

The World Meteorological Organization and the World Bank both have programs designed to take weather and climate service forward through improved cooperation and collaboration among the three sectors of the Weather Enterprise (Public, Private and Academic), increasing free and unrestricted access to weather and climate information, and the importance of well-maintained and reliable infrastructure supporting service provision. IFMS, supported by National Meteorological Societies, has the potential to provide vital support to these programs. We have a Value Proposition which takes our potential impact beyond scientific exchange to making a valued contribution through our member societies – and because we are all volunteers, we can provide a disproportionately high level of benefit with small investment. We are participating in and organizing initiatives to advance cooperation and collaboration worldwide across the Global Weather Enterprise through member societies and our support to the ongoing WMO and World Bank programs make a valuable addition to their success.

That said, we have included a variety of articles in this edition of the IFMS Newsletter. There is an article on what IFMS is doing for E&T to assist WMO in promoting the Global Campus Initiative (GCI) and UCAR in promoting their COMET Program. We are also holding Webinars on each of the two initiatives (GCI and COMET) in the first quarter of 2021. We have articles on our Collaboration promotion, and our effort to create Regional and National Meteorological Societies. We held the First Meteorology Summit of the African Nations on the above topic and it was very successful. Its summary is provided in this Newsletter. We also organized a meeting of the nations which constitute FLISMET- an organization consisting of Spanish and Portuguese

speaking nations from Latin America & the Iberian Peninsula (Spain and Portugal). That meeting was also very well received and was quite productive. Follow-up meetings are also planned.

In addition, there are articles from member societies on: India Meteorological Department's Cyclone Warning Services, Disaster Management and IFMS by Mr. Narayan Gautam, an abstract of Climate Service in Asia Pacific by authors from various universities and some announcements from the Royal Meteorological Society about their Prize Winners for 2019 and some of their publications.

We conducted two Webinars on PPA Collaboration by (1) Mr. Vladimir Tsirkunov Head GFDRR-WB and Dr. Jack Hayes retired Director of NWS-US on the Global Weather Enterprise Forum Initiative of the World Bank and (2) Mr. Dimitar Ivanov, Director, Public, Private Engagement at the WMO and Mr. Tatsuya Kimura – Consultant from JMA on WMO's Open Consultative Platform (OCP) and Public-Private Sector Collaboration. Another Webinar on IFMS and its Value Proposition was presented by Dr. Harinder Ahluwalia. All these Webinars were well attended and appreciated by the participants. All of them are available on the IFMS Website (www.ifms.org).

We hope to create an even closer relationship with WMO, the World Bank, Regional Meteorological Societies and National Meteorological Societies for the benefit of the National Meteorological Societies and the Global Weather Enterprise.

IFMS thrilled to welecome the recently elected council memebers and region representatives:

Prof. Liz Bentley

&

Mr. Michael Martens

Call for Volunteers

IFMS needs volunteers for various committees defined in this newsletter

please offer your services by sending an email with the following information:

1) Your contact information: Name, Society Affiliation, Email & cell phone number.
2) Area (s) of activities you would like to offer your volunteer services in
3) Send the email to the following address:

ifms_collaboration@gmail.com

In order to implement its Value Proposition (see the Article of IFMS Progress Report) we need volunteers for the following activities:

IFMS Collaboration

Ammar GABER – General Secretary of IFMS & Secretary General of SUMS
Dr. Buruhani Nyanzi – IFMS Vice President & President of TMS

Sharing information and knowledge are essential components of capacity building and performance improvement of the National Meteorological and Hydrological Societies (NMHSocs). Under the International Forum of Meteorological Societies (IFMS) there are more than 30 NMHSocs that operating in different countries under different conditions with variables and in some occasions with limited human and financial resources. More existing NMSocs are expected to join IFMS and we are in the process of creating new societies in countries which are large enough but they do not have an NMSoc.

A number of NMSocs are lacking the expertise, financial support and know how to conduct their businesses effectively and efficiently. In this regard, IFMS aims to support its member societies through the proposed collaboration process, which aims to network the societies and their members together to boost their performance and to maximize their impact on the national, regional and international levels through joint collaboration.

In order to supervise and guide this knowledge dissemination and experience sharing, IFMS developed its value proposition that aims to stimulate the other societies to join and encourage the countries that have not established their NMHSocs yet to do so. Not only encouraging the NHMSocs to join IFMS, but also providing support, networking and collaboration. To this end, IFMS formed special Committee to execute the collaboration process. The specific objectives of the Collaboration are as followed:

1. Bring the high quality and capacity societies in one platform with the societies that need support and guidance to increase their impact in their own countries and to collaborate with their counterpart or like-minded societies to implement their objectives effectively.
2. Organize, monitor and evaluate the collaboration process for better performance.
3. Respond to requests for collaboration in S&T between societies and between members of IFMS member societies.
4. Spread the knowledge and share the best practices.

To achieve these objects it requires a rigorous monitoring system to ensure that the collaboration objectives are well achieved. Therefore, IFMS has dedicated a separate web page on its website for collaboration.

Furthermore, collaboration opportunities and collaboration requests as well as collaboration approval forms have been prepared and made available on the IFMS collaboration web page ready for use.

To make this collaboration model reproducible and easy to implement, a processe steps flow-chart has been developed to guide the implementation process and to allow development and modifications whenever required.

Detailed description of the required steps to set up, implement and monitor the collaboration activities are explained in the flow-chart and the explanation documents. The implementation of the collaboration activities will be guided through a series of educational webinars that are designed to provide full details to the IFMS's member societies to offer or to request a collaboration opportunity or request, respectively. Designated volunteers will be responsible to provide any support or to respond to the questions regarding the various collaboration stages. In addition to the NHMSocs member societies, IFMS has regional member societies such as the European Meteorological Society (EMS) and Asian Meteorological Society (AsMS), The Federation of Latin American and Iberian Meteorological Societies (FLISMET), African Meteorological Society (AfMS)[1] and the recently created South Asian Meteorological Association (SAMA). Some of these societies are well established and functioning while others are still in the formation stage and still struggling to find volunteers to support them. IFMS works very effectively with their member societies to strengthen or establish their regional societies. African Meteorological Society (AfMS) is one of these regional societies which needs to be re-established and strengthened to play its crucial role in Africa. Such regional societies have potential role in boosting the collaboration among its members and with other societies.

The following are types of the global, regional and national collaboration activities that can be implemented under IFMS collaboration process:

- Joint activities within the country with relevant societies or academia and research institutes.
- Support of NHMSocs' members to participate in IFMS related conferences/meetings.
- Co-organizing the meteorological and other related global conferences.
- Support other societies to find global/regional funding agencies to facilitate the implementation of some activities on national or regional levels.
- Co-organizing scientific conferences and co-hosting IFMS GM.
- Capacity Development (Global, Regional and National levels).
- Journal preparation and publication.
- Publishing Research work of society members
- Co-authoring scientific research to be publish in IFMS member societies journals
- Coordinate and implement public and decision-makers awareness campaigns including the educational material preparation, reviewing and publishing.
- Support IFMS member societies to prepare their own value proposition to convince their respective governments to support their activities

1 AfMS will be recreated in February 2021

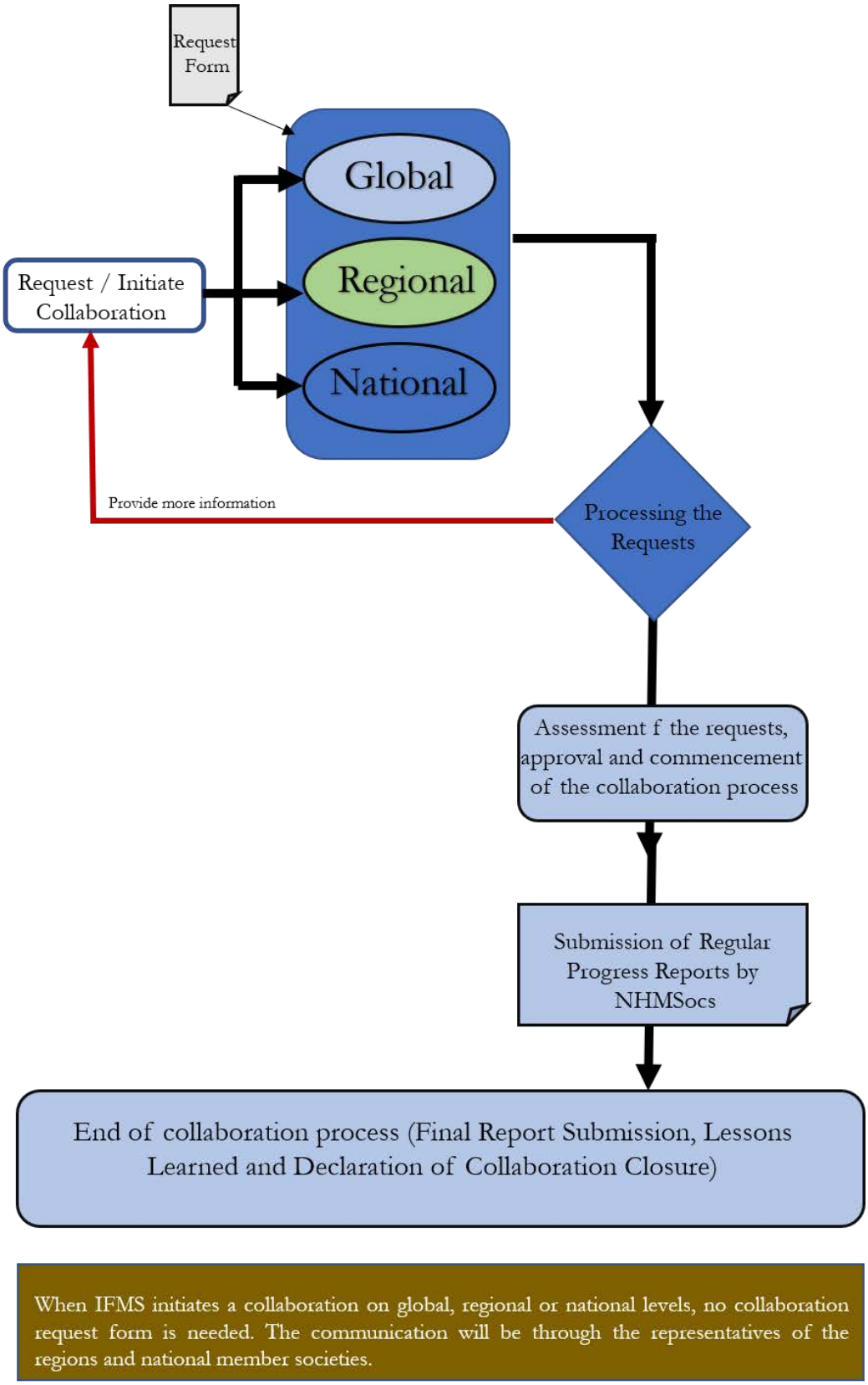


Figure 1: Flow chart of IFMS Collaboration Process.

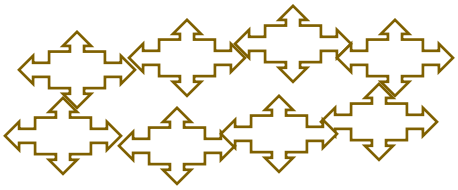
The expected outcomes from the collaboration process are well establish collaborative and strong national and regional Meteorological and Hydrological societies that functioning very well in their distinguished countries and regions to implement their objectives to contribute positively to the sustainable development of their countries.

In the same regards, IFMS is working towards upgrading its collaboration web page to handle the expected flow of collaboration offers and requests. The collaboration guidance webinars will be scheduled to take place online throughout the year. Regional gathering is applicable to make the webinar manageable. The documents that explain the collaboration process steps are also will be available and will be distributed after each webinar and will be uploaded on IFMS collaboration web page. There will be a call for translation of the guidelines to some of UN standard languages to increase the distribution and then after the implementation of the collaboration. On top of that, A&Q will be developed and publicly made available prior to the commencement of the collaboration process.

The main points that the collaboration covers are:

1. Mapping the available collaboration opportunities and the societies that are available to collaborate.
2. The gaps on knowledge and know how in the IFMS member societies, especially the developing countries.
3. Network both the societies and their experts to support those societies in need
4. Implementation of the highly needed collaboration activities and share the best practices out of them.

In conclusion, IFMS collaboration process is set up to provide the maximum possible value of the knowledge exchange, sharing best practices and know how transfer between IFMS member societies and their members on national and regional levels as well as the globally. Kicking off the collaboration process will be as soon as the fundamental steps are completed and the educational materials prepared. Public announcement will be disseminated to inform the IFMS member societies that the collaboration process is ready to be started. The success of this initiative depends essentially on IFMS and its member societies willingness and readiness to strengthen the collaboration.



IFMS – Assisting in Capacity Building through Education and Training

Prof. Sushil K. Dash, Dr. Harinder Ahluwalia, Mr. Ramesh C. Bhatia, Dr. Ajit Tyagi, Dr. Rattan K. Datta, Prof. Someshwar Das and Asst. Prof. Narayan Gautam

1. Introduction

Global Warming and Climate Change (**GW&CC**) are having serious effects on the weather patterns resulting in great loss of life, property and quality of life. All nations need to be fully prepared to handle all challenges resulting from the effects of GW&CC. As Covid19 has shown, unpreparedness for calamities, whether natural or man-made, can cause great disruption in life on top of loss of life and economic development. A very important part of preparedness is capacity building in all countries – especially in Developing and Least Developed countries - through Education and Training (**E&T**). World Meteorological Organisation (**WMO**) plays a very important role in the area of capacity building. However, due to the vastness of this task and limited resources, WMO can use assistance of other organizations such as IFMS, which can provide assistance through its member Societies.

Since climate change affects all sections of the society, all stake holders need to be educated adequately to understand the contribution of human beings to the climate change, take appropriate measures to adapt to the situation, make proper policies to safe guard the society, make adequate scientific progress to deliver early warnings, etc. Therefore, E&T related to climate change issues must not be limited to the professionals working in meteorology and students in educational institutions and researchers in research organisations. Appropriate E&T should also be imparted to the general public, school teachers and students, policy makers, administrators and stake holders in the fields of agriculture, human health, tourism, fishing industry, etc.

Almost all nations have their own meteorological agencies which regularly monitor weather and climate related data and forecast the weather at different time scales. These weather agencies train their employees regularly and WMO helps these weather men get adequate training in their respective organisations. WMO has also several Regional Training Centres (RTCs) set up for the benefit of cluster of nations. In the recent years, it has been felt that with the advancement of weather instruments and climate science, the training material and methods need to be upgraded appropriately. From that perspective, the Global Campus Initiative (GCI) has been born. The basic objective of this initiative is to impart state-of-the-art training to the meteorologists working in National Meteorological and Hydrological Services (NMHSs) in order to get them educated on the advancements in the weather and climate science and to get them prepared for the future demands of forecasting. GCI also encourages the RTCs to collaborate with other educational and research organisations, where member societies of IFMS can contribute significantly through the extension of outreach programmes.

Based on the above background, it is very clear that IFMS can and should assist WMO greatly in E&T in the field of weather and climate with the help of its member societies. Some of its member societies e.g. AMS and RMetS have well thought about and structured programmes for the benefit of students, teachers as well as the general public. Nevertheless, almost all member societies organise some programmes from time to time depending on their resources and availability of volunteers. ***It is the most opportune moment for IFMS to help its member societies go through some essential educational and training programmes in a coordinated way.*** The present Covid19 situation has opened the flood gates of online programmes. Such online programmes can reach large number of participants with little or no cost and can also provide them learning material at ease. It is well known that large number of online learning materials are available at different sites. Some are very popular sites such as COMET, MOOC (Massive Open Online Courses) by several universities, AMS, RMetS etc. Most of these courses are meant for undergraduate students and stake holders in terms of regular online certified courses. Some of those sites provide training on various aspects such as Numerical Weather Prediction, usage of satellite data for forecasting, etc. There are also other learning materials in terms of Webinars, popular lectures, special awareness programmes etc. One can conveniently categorise the existing sites into professional training programmes, awareness programmes, school and teacher oriented popular programmes, regular academic courses for students, stake holders etc. In addition to helping professionals in E&T, another important role of the Met Societies should be to take the weather and climate science to the people at large from the point of making them aware of the imminent dangers of climate change and educating them about their individual and collective roles.

2 IFMS Approach to assisting WMO in the Field of E&T

As already stated, E&T are very important components for capacity building especially so in Developing Countries (**DC**) and Least Developed Countries (**LDC**). We are forming a team of some outstanding experts in the field of training in meteorology. Our objective is to ensure that our work helps as many people as possible to learn from the courses available on the identified websites. We believe that if IFMS can make a central repository of Training Material, that would be a useful contribution to Capacity Building effort of WMO and the World Bank (**WB**).

Our first activity is to define the categories of courses which will be helpful in training various classes of people e.g. ***Forecasters, Briefers, Disaster Management groups, Infrastructure, Processing Systems, Teachers, Students, Public and Government***. Next activity is to identify all existing E&T courses and mechanisms available in above categories. ***Readers are requested to suggest other categories of Courses we should include and offer their services to be part of this noble effort.***

We will then perform Gap Analysis between what is available and what is required. This will be achieved by providing the results of our investigations to our member societies and asking them to identify what they feel should be added. After the Gap Analysis, we will decide what to do about the gaps depending upon the available resources to us.

We will collate the above work into a comprehensive document clearly identifying what is available on-line and what is not but can be easily put online. We will also identify courses available through **RTC**s. If we need to develop courses, based on the Experts available to us, we will need to assign priority on the sequence of the courses to be developed. All this material will be made available to all our member societies and any other qualified interested parties.

We believe that Public Education and Government Awareness are quite important for increasing the government support for additional financial and manpower resources for Capacity Building. In addition, Teacher and Student Training Courses will also be identified and gaps filled by developing missing courses based on available resources. Cooperative development of E&T material as opposed to each society working on its own is the key to success. We expect to distribute the required tasks among our member societies.
Some of the Life Members of the Indian Meteorological Society (**IMS**) have very kindly accepted to lead this effort; but ***we need a number of additional experts in areas highlighted above to do a high-quality job and achieve*** this very important Capacity Building Objective. More expert volunteers offer their services, more we can achieve.

3 Short Summary of E&T Courses

In the following sections, we summarize the type of courses we plan to cover at the outset.

Some important points to keep in mind are that any Training material we prepare should be modular in nature so that after going through certain fixed number of predefined modules, trainees gain sufficient knowledge in a particular area of the subject. A short self-evaluation exercise should also be provided after completion of lessons/modules of a particular subject studied. This approach will provide an opportunity to the trainees to make a self-assessment of their level of absorption of material contained in the modules. It is well known that weather and climate are close to nature which all of us experience in day-today life. To have a good understanding of the subject, the training should devote more time on hands-on experience. Although hands-on experience is crucial to any teaching, in case of weather and climate education, practical trainings will generate more interest. The whole ocean-atmosphere-land system can be used as a laboratory for E&T. For convenience of all, E&T courses can be categorised under the six items described in the following sections. However, to start with, IFMS will give emphasis on the first two items such as Teachers & Students Training and Public Awareness of Weather and Climate Disasters. Furthermore, there will be more dependence on online method of E&T. Where necessary and affordable, hybrid method of both physical and online can be adopted.

3.1 Teachers and Students Training

Children are the future of the society and teaching them the conventional science courses such as physics, chemistry, mathematics, geography, environmental science from the point of climate science will help them prepare for their future educational advancement and hence contribution to climate change mitigation in terms of alternative source of energy and sustainable development. Teachers are the backbone of any society and they are the main source of learning for the students. Hence, training the teachers will have cascading effect. Science and Geography teachers in the schools will be ideal for weather and climate related topics. They in turn can train their other interested colleagues. To start with, IFMS can identify the freely available learning sites related to teachers and students and make those available to all its member societies.

We are searching for Training Courses available from well known organizations such as COMET, WMO (e.g. through Global Campus Initiative and Regional Training Centres (RTCs)), ECMWF, larger and well-established societies, etc. We will coordinate our efforts with WMO's Global Campus Initiative and COMET as well as other sources of Training Courses. We will also request the assistance of the World Bank for any required financial assistance.

By training a teacher, one trains several others in the way of cascading effect. In several countries, there are very few colleges/universities/organisations where weather and climate related teaching and research have been going on. Except in some developed countries, there is no climate science course at the school level. Geography is the only subject taught at schools which covers some aspects of the climate. Science of weather and climate is interdisciplinary in nature and it covers all important science subjects such as physics, chemistry, mathematics and geography in schools. Teachers, once exposed to climate science can easily explain their students all the present salient issues related to climate change. In India, in the past and on experimental basis, Department of Science and Technology (DST) in India had initiated a programme named PROBE in several schools across the country by setting up of weather observatories. Special training programmes were also conducted for the school teachers. There is no doubt that PROBE was well received by the teachers and students.

Ministry of Earth Sciences (**MoES**) of India has funded some teachers training programmes and implemented them through India Meteorological Society (**IMS**) which has successfully organised such programmes at its local chapters. ***Teachers are appreciating such programmes and there is increasing demand for more such training programmes in the future.*** It is essential to formulate specific course materials for the teachers so that they will have good exposure to basics of weather and climate science, the observational set up, mathematical models, climate change, weather extremes and related other issues. Today, there are online courses available on basics of weather and climate science. However, it is very important that these courses are made region specific so as to create interest in the field. When a topic is discussed based on the regional climate events such as cyclones, extremes in rain and temperature, thunderstorms and lightning, occurrence of fog, snowfall etc., it brings the teachers and students closer to home and they can easily correlate the scientific thoughts to the events. Using local language is also another important issue. Experts can visit specific schools and give seminars so that students will be exposed to basics of climate science and the challenges of climate changes. Such efforts will encourage students to know more about climate by opting for higher studies along this line.

3.2 Public Awareness of Weather and Climate Disasters

Weather and Climate affect all sections of the society. Least Developed and Developing countries are highly vulnerable to weather and climate extremes. Public suffer loss of lives and livelihood from devastation caused by tropical cyclones, floods, local severe storms, lightening, heat and cold waves, flash floods and landslides. The impact of climate variability and change on agriculture, water, health, energy and other climate sensitive sectors is going to pose great challenge to society in the coming years. Common man does not understand jargon and intricacies of weather forecasts, climate science and impact of climate variability on their day to day life.

Weather and climate science has made considerable progress and have developed capacities to monitor severe weather development in real time and to issue warnings well in advance for public to take safety measures. Climate data and projections have been found useful in developing climate resilience. However, big gap exists between science and its application at ground level. Awareness and basic understanding of weather, environment and climate and their impact on lives of a person in the field is therefore essential for developing resilience. The challenge lies in making society '**Weather Ready and Climate Smart**' to reduce vulnerability of the society to today's weather hazards and increase resilience to future climate change. It calls for promoting general awareness among public. It can be achieved by developing online Awareness modules and conducting

training of opinion makers/mentors like teachers, civil society volunteers and government officials. Training Modules for public awareness are available which can be collected and made region specific.

Studies have shown that disasters either natural or manmade are on the rise. It is one of the challenging phenomena especially for developing countries. Various relevant institutions/stakeholders have been significantly contributing to reduce disasters in their regions. However, it is expected to achieve significant improvements in disaster management with collaborative efforts. In this case, a remarkable initiation is planned by IFMS to enhance E&T in disaster management especially in water and/or climate induced disasters. IFMS will play a considerable role like an 'umbrella' of various National Met Societies and Regional Met Societies in the world.

3.3 Exposure to Numerical Weather Prediction

Today, objective weather forecasting at all time scales and climate projections are usually based on the output from Numerical Weather Prediction (NWP) models. Millions of meteorological observations are received everyday from a wide variety of sources at the operational NWP centres from across the world. These observations play a significant role in improving the quality of forecasts through data assimilation in the model. The young generations should be made aware of the importance of such observations, which are collected by spending billions of dollars in building infrastructure described in Section 3.5 below.

For giving better operational forecasts, in addition to output from a number of models in ensemble mode, forecasters also use their own subjective experiences. These models are based on a number of coupled nonlinear basic equations which the atmosphere-ocean system follows. Solutions are created to resolve the problems related to, initialization, parameterization of small-scale events, inclusion of the model orographic features, computational methods, model output statistics, use of AI in prediction of meso scale events. All these computations need High Performance Computing (**HPC**). With the availability of higher and faster computational facilities, coupled ocean atmospheric models and earth system models have been increasingly used for predicting weather and climate by taking care of chaotic nature of fluid dynamics and ensembles forecasting.

Although there has been more emphasis on NWP, these models are based on a number of approximations in the calculation of the physical processes occurring in the nature and eventually in the solution of complicated nonlinear equations. All models have errors and hence scientists are working hard to reduce these errors in order to make forecasts as close to the observation as possible. It is very essential that students are exposed to the basics of these modeling tools and understand the sources of errors. Today, AI&ML (Artificial Intelligence and Machine Learning) are being used in several institutions to develop more accurate models and also give operational forecasting to combat the losses due to climate related disasters. Clime uncertainties are the main issues which come on the way of climate services. These facts should be explained to the students from very early age so that when they grow their scientific thinking will be shaped accordingly and they can innovate new ideas in R&D. It is proposed to explain the students as well as teachers the basic facts about NWP and the methods of forecasting for producing better NWP output products.

3.4 Satellite Data Use

Meteorological data obtained from weather satellites plays a very vital role in all real time weather forecasting systems used worldwide. More than 90% of data input to the systems comes from satellites. Satellite images give true pictures of the weather and climate at every point on the globe and these can explain various

atmospheric phenomena very easily. Therefore, proper training on use of satellite data in weather forecasting is of utmost importance. This is an area involving a very high level of technology. It is necessary to build up a very strong base of fundamental principles involved in satellite meteorology starting with the very basic levels.

Satellites are capable of providing a large variety of different types of observations useful for weather and climate related applications. Therefore, E&T through satellite images will be the best practical way for the trainees to learn the subject. Training material should be designed to provide adequate knowledge about the type of observations and their specific applications. General approach to be used for preparation of training materials for various types of satellite data and products should be in accordance with certain guidelines which need to be defined in the beginning of this effort.

3.5 Data Collection Infrastructure

In addition to training on the usage of all types of data to do weather forecasting, it is also important to understand the infrastructure required to collect the required data and identify the sources from where this data can be obtained. There needs to be a course on various levels of infrastructure required for obtaining data e.g., most basic infrastructure requirements (collection of Hydromet data through Automated Weather Stations equipped with sensors), satellite data sources, NWP data sources, etc. Additional types of data require additional investment in infrastructure; for example, one has to purchase Radars, Lightning Detection Network (**LDN**) and Radiosondes network. More sophisticated NMHSs also install additional sources of data such as Radiometers, Wind Profiles, etc. A course on infrastructure would go a long way in improving weather forecasting.

3.6 Processing and Display Systems

In today's world, major centres of the world run Global Circulation Models (GCMs), output of which is available to Users world-wide. Developing and Least developed countries do not need to buy High Performance Computers which are very expensive. A reasonable sized affordable Computer System is sufficient to run regional models or mesoscale models. Meteorological Services using Radio Sondes and LDN can purchase the corresponding processing systems from the suppliers of this equipment.

That leads us to Processing and Rendering Systems. This is the most crucial component of the system because that is what the Forecasters use most. That is the system which collects and processes all types of data (Alphanumeric, GRIB, BUFR, Satellite Imagery, Radar Imagery, LDN data, etc.), and renders it for the user. It provides capability to process and display Satellite and Radar Imagery, Model Output, Significant Weather Charts, alphanumeric data and LDB data. Therefore, training on the usage of such systems is also necessary.

4 Conclusions

Education & Training on all aspects of weather forecasting as well as Infrastructure are the two of the most essential ingredients to fight against the Global Warming and Climate Change (**GW&CC**). Two most fundamental areas to be managed to achieve success are:

1. Measures to reduce Green House Gases (**GHG**) to control Global Warming, and
2. Given that Global Warming is happening, we need to build capacity to withstand the effects of Climate Change with least loss of life and property.

Governments of various countries are working on the reduction of GHG by having discussions and signing accords to reduce Global Warming.

Our job is to concentrate on the second aspect which is assisting WMO and the WB in Building Capacity through Education and Training (**E&T**) and providing any advice in building infrastructure through our expert volunteers.

Considering the complexity of the climate change, its origin, uncertainties, and tremendous adverse impacts on the society, it is of paramount importance that various facets of climate science and climate change reach the people of all sectors in the society. IFMS has a very responsible role to take science to the professionals and society at large by organising various types of events through web-based gadgets or local Meteorological Societies and their chapters. There are several ways in which "Awareness about the extreme weather events" and related safety issues can be created in the society at large. Human contribution to climate change can be conveyed to the people in simple local languages by organising town hall seminars, Webinars and also in schools and colleges. World over, International Days are observed on important topics and issues to increase awareness. Mostly, the meteorological community is involved with World Meteorological Day, World Environmental Day, Ozone Day, Water Day and Oceans Day. Some of the local chapters of IMS have been observing some of these days in a limited way due to the paucity of funds. When specific funds are available to the local chapters, they can involve more people and celebrate these important days by arranging invited talks that will educate the people. There can also be interactive sessions and specific field visits on these days. In addition, we should also use mass media to convey our message. This requires convincing local and national TV and Radio stations and print media to publicize the issues related to GW&C. ***IFMS should create best practices for implementing these recommendations around the world.***

Since travel component of E&T is expensive and an impediment in making this method of capacity building freely available, we would like to stress on "Online Courses" with due regard to the activities happening in Regional Training Centres of WMO.

We will provide Webinars on current issues and topics of interest to keep people up to date for which we will use the services of volunteer experts.

We are confident to achieve our above E&T objectives by the approach outlined in this article. It must also be noted that all our work will be done in coordination with WMO and where appropriate with the World Bank.

Normally, each society has to do the above tasks on its own. Your IFMS can divide the work and coordinate this effort to achieve better results. Because of being closer to the action, The Regional and especially Sub-Regional Meteorological Societies also have an important role to play in capacity building through E&T. Countries in the sub-region have a lot more in common in terms of climatic conditions and level of requirement for training; therefore, they can tailor training programs to meet the specific requirements of the sub-region.

All our Member Societies and those interested in Capacity Building around the world have to do is to provide us some volunteer experts in each of the above areas and then watch the results this strategy can achieve by dividing the work and making the "whole bigger than the sum of its parts".

Report on the IFMS organized Meteorology Summit of Africa to Create African Meteorological Society & National Meteorological Societies

Dr. Buruhani Nyenzi, Mr. Workneh Degefu & Dr. Harinder Ahluwalia

1 Background

The major objective of IFMS is to unite all National Meteorological Societies (NMSocs) of the world to assist WMO and the World Bank (WB) for building capacity around the world to build capacity do better weather forecasting to withstand the adverse effects of Global Warming and Climate Change (GW&CC). In order to achieve that we are creating collaboration among existing societies, creating new societies where such a society does not exist and assisting Educations and Training (E&T) effort of WMO by assisting in its Global Campus Initiative and COMET's training Programs. Since each continent has its unique characteristics, we believe that our objectives can be better achieved by working with Regional Meteorological Societies (RMSs). Some RMSs exist and others are in the process of being created. The European Meteorological Society (EMS) has membership of affluent and advanced nations and is progressing well. FLISMET which was created in 1986 needs to be strengthened and RMSs in other continents need to be created. The meeting being reported in this article was held on December 10, 2020 to re-create African Meteorological Society (AfMS) and National Meteorological Societies in Africa – a continent which needs help to build capacity.

5 Summary of the Summit

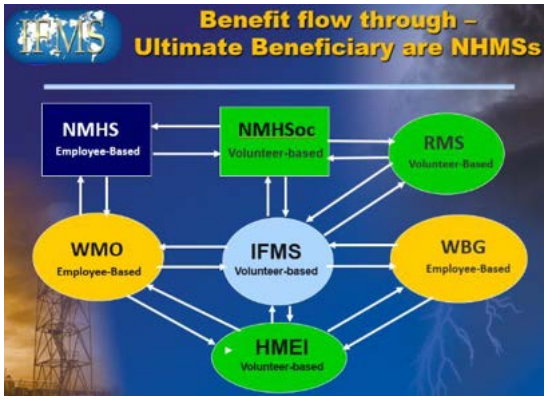
The first Meteorology Summit of African Nations to re-create the African Meteorological Society and National Meteorological Societies was held on December 10, 2020. It was attended by invited heads of National Meteorological Services of many African countries, officials of the WMO's Regional Office for Africa, management of existing Meteorological Societies of African Nations and other interested senior officials. The following sections present some of the speeches given by two of the most prominent personalities of African Meteorological milieu.

Dr. Harinder Ahluwalia spoke about IFMS and its Value Proposition with special emphasis on Collaboration, Creation/Strengthening of Regional Meteorological Societies and National Meteorological Societies and Capacity Building through Educations and Training (**E&T**). He also encouraged NMSocs to involve

the Private Sector in their operations and create real collaboration between the Public, Private and Academic (**PPA**) Sectors to support the current initiative of WMO passed in Cg18 held in June 2019 in Geneva and depicted by WMO in the adjoining diagram.

Mr. Workneh Degefu spoke about the previous incarnation of the African Meteorological Society (**AfMS**) which was created in 1987, in Bujumbura, Burundi where WMOs Regional Office used to be. AfMS failed because of many reasons some of which are lack of financial support and lack of volunteers. He also presented a draft constitution for the recreation of AfMS for the comments of the participants.

Mr. Degefu's presentation was followed by that of Dr. Ahluwalia who outlined the steps being taken to ensure that new Society not only survives but also thrives. This time we will be asking for a wide support of all African Nations not only morally but also financially as well as in kind support. We are also working on identifying volunteers and have been quite successful in this endeavour up to now. In order to have a strong and meaningful AfMS, we need to have NMSocs in all African countries where such societies can be viable. We are trying to convince the National Meteorological Services (**NMHSs**) that the National Meteorological Societies (NMSocs) are the other side of the same coin trying to assist NMHSs in promoting the S&T of meteorology, capacity building through E&T and providing a venue for PPA sectors to network and interact with each other. Being volunteer based, NMSocs can provide much higher leverage on any investment done by NMHSs in them. Finally, he stated that the centre of Meteorological Universe are the NMSs and the rest of the infrastructure is to strengthen them so that they can do a better job of serving the society at large.



In the following two sections we present two important speeches given by Dr. Agnes Kijazi, the third Vice-President of WMO and Dr. Amos Makarau, Director of WMO's RA1 Office in Addis Ababa.

6 Welcoming remarks by Dr. Buruhani Nyenzi and introduction of Dr. Agnes Kijazi

Dr. Buruhani Nyenzi is the Vice-President-Administration of IFMS. He is also the President of the Tanzanian Meteorological Society. President John Magufuli of the United Republic of Tanzania reappointed Dr. Buruhani Nyenzi to Chair the Board of Directors of the Tanzania Meteorological Authority (TMA).

He recognised the presence of Dr. Agnes Kijazi who is the current Director General of Tanzania Meteorological Authority (TMA), Permanent Representative (PR) of Tanzania with the World Meteorological Organization (WMO) and the Third Vice President of WMO. She is the first woman from Africa and the developing world to hold such a high position in the WMO Bureau. Dr. Kijazi has served in various capacities related to Meteorology at global and regional levels. Within WMO itself, in addition to being the Third Vice President of WMO, she is also the Chair of WMO's Capacity Development Panel (CDP). She has been a Member of the WMO Executive Council (EC) since 2012 to date. In the United Nations, she is a Member and Co-Chair of the UN-10 Member Group to support the Technology Facilitation

Mechanism (TFM) for achievement of Sustainable Development Goals (SDGs). She holds senior positions in many African Organizations.

6.2 Remarks made by Dr. Agnes Kijazi

First of all, she expressed her gratitude to IFMS for inviting her to this important meeting and for the opportunity to share some of her insights. Secondly, she commended the efforts made by IFMS to strengthen the role of Meteorological Societies in the world and now in Africa through creation of the African Meteorological Society (AfMS).

She expressed that the idea of establishing the African Meteorological Society is one of the important milestones towards bridging the capacity gap in weather, climate and water services, particularly in Africa where there is an urgent need to support the work of NMHSs in the region. The initiative is also consistent with the WMO Strategic plan for 2020-2023 in advocating collaboration and partnership among various actors in weather, climate and water services. The aim is to leverage investment and enhance capability and performance of NMHSs to deliver improved outcomes for the society at large. She, therefore, encouraged partnerships including public-private partnership geared towards bridging the existing infrastructure gap in the observation network of the NMHSs in Africa. Herself being the Chair of the WMO Capacity Development Panel (CDP), where one of their mandate is to identify policy-related gaps in the capacity of NMHSs to exchange data, to deliver adequate services, to comply with WMO Standards and recommended practices, bearing in mind the Geneva Declaration 2019. Therefore, the creation of AfMS will assist in propelling this initiative for the betterment of the livelihood in Africa.

Based on its objectives as stipulated in the AfMS draft constitution, the African Meteorological Society will have the potential to support in enhancing the capacity of NMHSs in weather, climate and water services delivery to the society through advancing the science and technology of meteorology and related fields, and their applications.

Furthermore, The African Meteorological Society will be an avenue to bring together members of National Meteorological Societies with diverse expertise and experiences (ranging from professionals in meteorology and related sciences, providers, and users of climate services, as well as organizations affiliated with meteorology) to deliberate on regional level matters and to come up with resolutions and recommendations that will benefit our entire Continent.

She concluded by urging all stakeholders to support the establishment of the African Meteorological Society and facilitate the realization of its vision. Furthermore, she encouraged African NMHSs to consider taking lead in establishing National Meteorological Societies (NMSocs) and support their sustainability. This is a very important stage towards the greater goal of forming and strengthening the anticipated Regional or Sub-Regional Meteorological Societies and the African Meteorological Society (AfMS).

Her comprehensive look at the situation in Africa and encouragement for creation of the African Meteorological Society and National Meteorological Societies in those countries where such a society does not exist, are greatly appreciated by IFMS and all attendees in this meeting.

7 Remarks made by Dr. Amos Makarau

Dr. Amos Makarau was introduced by Mr Workneh Degefu who is the representative of Africa (Region RA1) on the Council of the International Forum of Meteorological Societies (IFMS) of the World since September 2018. He is also the Chair of IFMS' Committee on "Membership promotion and creation of new societies" known as Committee 3.2 or C3.2. Dr. Amos Makarau joined WMO on 9 February, 2019 as the WMO Regional Director for Africa (RA1). He is currently based in Addis Ababa, Ethiopia where WMO's RA1 office is located. He is originally from Zimbabwe. He was formerly the Director of the Meteorological Services Department and the Permanent Representative of Zimbabwe with WMO until 2018. He had also been the Vice-President of WMO Regional Association 1 (Africa) from 2007 before becoming the President of RA-I from 2015 to 2018. His main priority is to contribute to WMO's desire and thrust to reduce the meteorology development gap among WMO members. This is especially the case in Africa which is the home to 34 of the 48 Least Developed Countries, which comprises of countries that are most vulnerable to hydro-meteorologically related disasters and where many NMHSs still lack satisfactory visibility and relevance in their countries. His guiding principles include fairness and transparency, confidentiality when required, giving equal opportunities to all (including gender, disabled and people of determination) and leaving no NMHS behind.

7.2 Remarks made by Dr. Amos Makarau

Dr. Amos Makarau made his remarks mainly on the proposed African Meteorological Society. He pointed out that as it is being established, it will be important to observe issues like nomenclature used, membership to the Society, Governance and other working structures and committees.

On nomenclature, he proposed that as this will be a new society which brings together membership of other societies in the continent, it could be given a name that conveys better the message. He proposed to call it an Association of the African Meteorological Societies (AAMS) rather than calling it African Meteorological Society (AfMS), a name which it had before. He however pointed out that there could be other names for consideration for the new Society. He further pointed out that the constitution of the new Society needs to be clear on Membership such that who are the Core Members of the society which is likely to be the NMetSocs; who are the Associate Members which may include other societies, donors, individuals, and other affiliates such as UNECA, AUC, AMCOMET, AMCOW, AMCEN Academia and observers.

In terms of governance of the Society he pointed out that the following issues need to be clearly defined and observed in the constitution of the new society:

- Administration/ Management (Bureau and Secrétariat),
- Constitution (legality, ratification, Tenure of office bearers),
- Institutional Arrangements: (Seat of Secretariat),
- Guiding principles: (rights and privileges, clear TORs); and
- Accountability (oversight, code of conduct/ethics).

He also pointed out that the Society will need to consider other working structures/ Committees of the Society in various areas of activities including the following:

- ✓ Innovation and Research (e.g., CR4D I (Climate Research for Development);

- ✓ Editorial Board (e.g., Journals, Newsletters, Promotional material);
- ✓ Fellowship Board; and
- ✓ Committee to propose inductees into the Africa Hall of Fame in Meteorology.

He informed the meeting that WMO has provided a slot for discussion on establishment of AfMS. Proposed to have a conference on these matters in 2022 and informed the meeting that the PR of Nigeria with WMO had indicated that the Nigerian Meteorological Authority would like to host the first meeting of the Founding Members of AfMS.

His comprehensive presentation was much appreciated by the Summit organizers and attendees.

8 Comments of some of the Attendees of the Summit

Stephen Njoroge, previous WMO Representative for the Subregional Office for Eastern and Southern Africa and Executive Secretary of the dissolved AfMS, stated that when AfMS is formed we must have our journal for scientists to publish their papers; He outlined the problems faced by AfMS to function properly.

Mr. Apuuli Bwango is the Chairman of the Ugandan National Meteorological Authority thanked IFMS for organizing the meeting; he informed the meeting that the Uganda National Meteorological Authority is working to revive the Uganda Meteorological Society (UMS) and make sure it starts working well; and supported the idea of re-establishing AfMS

Prof, Peter Odjugo is the Director of R&D in Nigerian Meteorological Service informed the meeting that both NMA and NMSoc will give full support to AfMS; and supported the idea of holding the African Conference.

Dr. Hassan Addoma is the President of the Sudanese Meteorological Society commented that the meeting itself was a great success; the attendance of the Third -Vice President of the WMO is another great support for the meeting and the proposed Society. He believed that the great challenges which he thought AfMS will face will be: The financial funding, communications and volunteering.

The following comments of Mr. Sam Ochoto, who is the Executive Secretary of the Ugandan Meteorological Society, were especially encouraging lowing message:

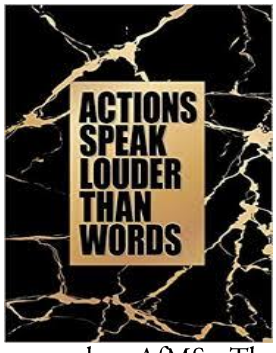
"Thanks for the tireless commitment you are offering to the cause of Meteorological Societies Nationally, Regionally and Globally. I am sure that IFMS has come at the right time to help push the Meteorological Societies and soon Meteorological Societies will be a force to reckon with Internationally."

A number of attendees supported the change in the name of the African Meteorological Society. One proposed new name was: Association of the African Meteorological Societies (AAMS). Other potential names can be submitted through the Survey which IFMS is conducting after the Summit.

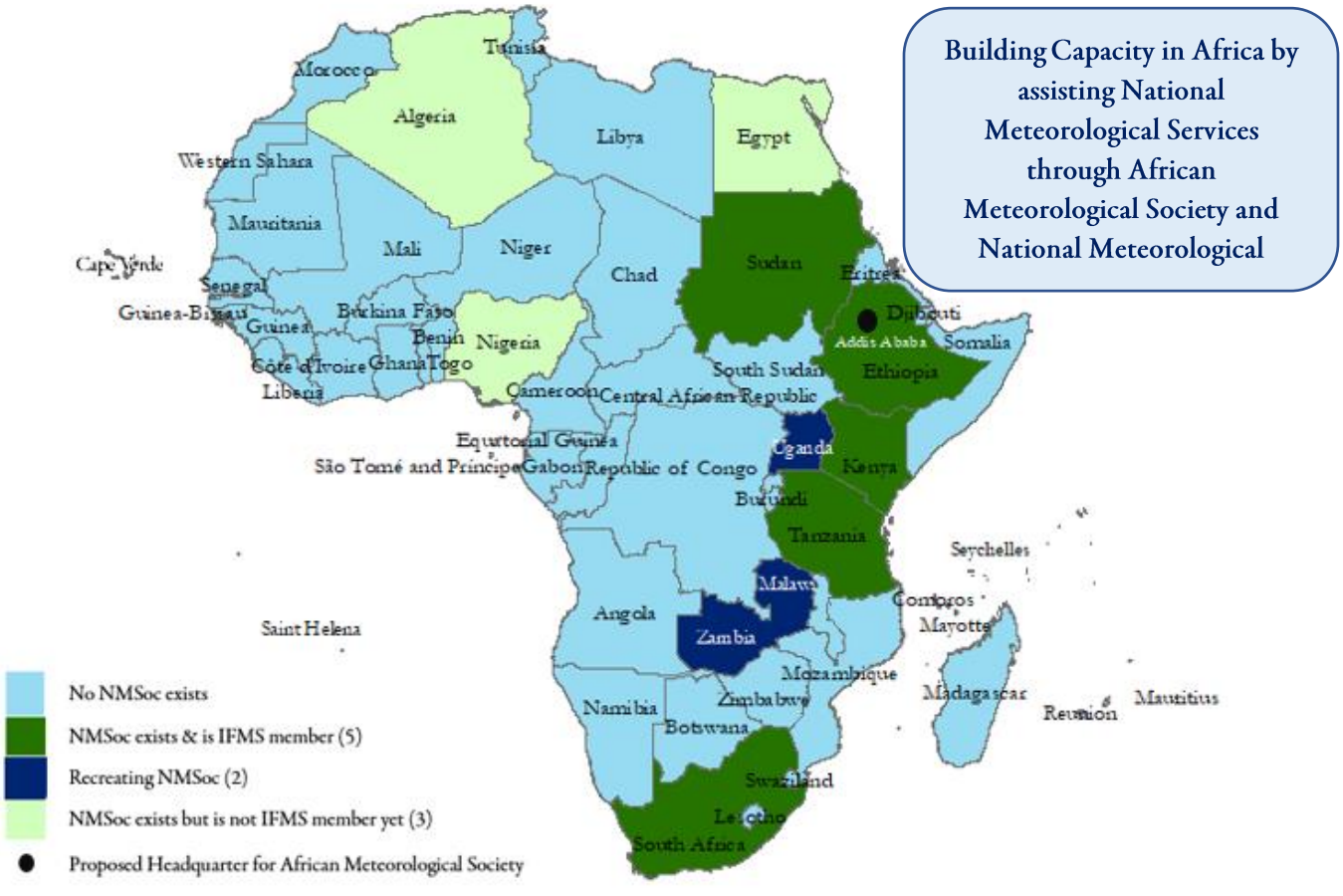
A comprehensive summary of the Summit was produced and distributed to all attendees and those who could not attend but had shown strong interest in the subject matter.

9 Conclusions

The first Meteorological Summit of the African Nations to re-create the AfMS and create NMSocs in those countries where they do not yet exist was strongly supported by all attendees. Follow up actions were also agreed upon. The presence of and addresses by Dr. Agnes Kijazi and Dr. Amos Makarau as well as involvement of IFMS were much appreciated by attendees. Because of the negative experience of the last incarnation of AfMS, some attendees showed some apprehension about the success of the new Society. But Dr. Harinder Ahluwalia tried to ally these fears by stating that the foundation we are building for this new incarnation, which includes involving the National Meteorological Services and their Heads and PRs, WMO RA1 Office, ensuring funding and volunteers, will ensure its success. In addition, the new society will have strong support of IFMS and we are trying to arrange some mentoring by well-established members of IFMS such as EMS, AMS, RMetS, IMS, etc. will help strengthen AfMS. The availability of modern means of conducting online Meetings, Webinars, Training and Conferences are another very strong reason for the success of the New AfMS. One can conduct many of these activities on a regular basis without much cost. At least in the beginning. the Secretariat should be staffed by volunteers with reasonable honorarium rather than salaries to optimize costs. The Constitution of the new society has been distributed to the potential member states and their comments are awaited. A Survey of all attendees is being conducted to get their feedback. The steps to implement the re-creation of AfMS have been outlined with their milestones.



The next Summit is planned to be held on February 10, 2021.



Creation of African Meteorological Society (AfMS)

Mr. Workneh Degefu, Dr. Buruhani Nyenzi, Mr. Ammar Gaber and
Dr. Harinder Ahluwalia

IFMS is pleased to announce the creation of the African Meteorological Society (AfMS) on February 10, 2021. We are very thankful to Dr. Agnes Kijazi, the 3rd Vice President of WMO and Dr. Amos Makarau, Director of WMOs RA1 office in Addis Ababa, Ethiopia for their very strong support for this mission. We would also like to thank many heads of National Meteorological Services (WMO PRs) and other professionals who attended the two meetings, we held for the creation of the African Meteorological Society, and strongly supported this undertaking.

We will now finalize the Draft Constitution we had distributed for comments and start the registration process of the African Meteorological Society.

We are also working on creating National Meteorological Societies (NMSocs) in countries where they do not currently exist.

We also urge all existing Societies which are not yet members of IFMS to become members. Being a member of Regional Meteorological Society like AfMS, EMS, FLISMET, etc. only covers you on Regional/Continental Level, whereas, IFMS connects you to all regions of the world.

Our next mission is to create an Asian Meteorological Society.

With Complements from our Team which assisted in Creating African and National Meteorological Societies.

Facing the Challenge of GW&CC through co-operation & investing in Capacity Building

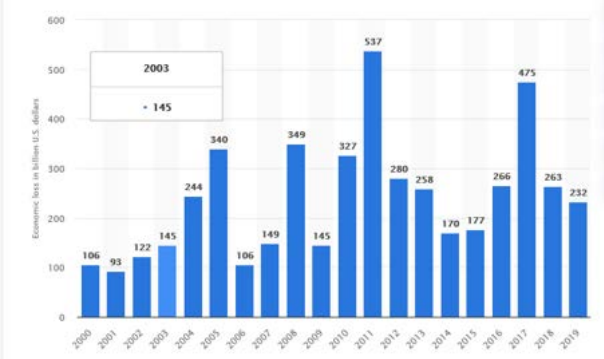
Dr. Harinder P. S. Ahluwalia, President – International Forum of Meteorological Societies (IFMS)

With the world facing the challenge of **Global Warming and Climate Change (GW&CC),** organizations related to weather, water and oceanography as well as disaster management have the responsibility to educate governments and the public in understanding the causes and the ways to mitigate the effects of these global changes. It is observed that neither many governments nor the public fully appreciate the need for investment in infrastructure and Capacity Building against **GW&CC.** As per the information provided below, when we look at the loss of life and property caused by inadequate institutional and societal capacity, *we would be convinced that the idea of balancing budgets by cutting the allocations in these areas is counter-productive.* Adequate funding for creating and maintaining infrastructure and creating capacity is paramount to fighting Global Warming – preparedness is the key. We should learn our lesson from the current COVID-19 pandemic that by ignoring the potential problematic issues, one day we will have to pay heavily for this neglect. The world did not properly prepare itself for such a pandemic despite warnings and today we are paying heavily both in terms of loss of lives and financial losses.

Handling the challenge of Global Warming requires a two-pronged attack:

(1) ***tackling the causes of Global Warming*** **and**

(2) ***knowing that Global Warming is happening, learning how to protect ourselves.***



Worldwide losses from Natural Disasters in the past 20 years are shown in the adjoining graphs from Statista site. According to a U.N. report, hundreds of floods, storms, heat waves and droughts have left about 606,000 people dead and 4.1 billion injured or homeless around the world since 1995. This trend of losses is on the rise. In most countries, the natural hazard risk is compounded by poor institutional and societal capacity to manage, respond and recover from natural hazardous events.

USA, China, India, Philippines and Indonesia are the five most disaster-prone countries in the world. In 2018 in the **United States**, 355 lives and $52 billion worth of property were lost, down from a total of $78 billion for 2017. For equivalent disasters, most other countries would have a much greater loss of life and property as compared to the USA. USA having some of the best institutional and societal capacity in forecasting and disaster management is able to handle these disasters better than most other countries. However, more improvements can be brought in with additional intelligently planned investments.

In Canada, all told 103 ***deaths*** and nearly $3 billion in absolute ***losses*** were attributed to extreme weather in 2018. Canada, like most other advanced nations, also has relatively strong institutional capacity, however, even the advanced nations must plan and invest much more in this area to reduce the impact of eventual catastrophic events.

The reduction in losses comes from having strong forecasting capability and institutional and societal capacity and preparedness to handle the aftermath. Forecasting capability requires an extensive monitoring network and related infrastructure (e.g., computing and communication power, etc.) as well as highly educated and trained manpower. It is quite obvious that this capability is required to be created around the world to ensure that nations can better protect themselves.

It is difficult to understand why most nations would not allocate sufficient funds to build capacity against GW&CC given the *potential return on this investment.* This aspect is not getting the same exposure as the mitigation of Global Warming which certainly needs great attention because it is the root cause of GW&CC. We have seen many top-level international conferences and meetings involving heads of states, resulting in agreements (e.g., Agreements signed in Kyoto, Paris, Montreal, etc.) for mitigation of Global Warming but no such activities have been seen at the highest level for the development of institutional and societal capacity to manage, respond and recover from natural hazardous events. The business case for investment in this area is quite obvious – reasonable investment in Capacity Building can reduce losses of property and life considerably.

There are various organizations involved in building capacity around the world which include the World Meteorological Organization (WMO), World Bank Group (WBG), as well as Continental Banks such as Asia Development Bank, African Development Bank, etc. In addition, International Aid Agencies such as USAID, UK Aid and equivalent programs in Canada, Australia, Germany, France, Italy, etc. are interested in building capacity against **GW&CC** around the world, especially in developing and least developed countries. They are spending substantial amounts of money to create capacity. For example, in 2015, Canada allocated approximately C$2.5 Billion over 5 years for assisting developing countries to build capacity to withstand the effects of Global Warming. If even a small part of it were invested in National Meteorological Services which are responsible for national Capacity Building in terms of infrastructure and technology and National Meteorological Societies which are volunteer-based and are organizing events to build capacity in terms of knowledge and professional development, it would make a big difference in Capacity Building in these countries. Add to that the assistance from other International Aid Agencies, one can imagine how much difference that would make in Capacity Building in these countries. In addition, many philanthropic organizations like the Bill & Melinda Gates Foundation, Bloomberg Philanthropies, etc. provide funding to many developing countries for Capacity Building.

As Mr. Vladimir Tsirkunov of the World Bank stated in the IFMS Global Meeting #6 in Boston: *"Overall, despite the significant increase of investments in NMHSs by the World Bank, WMO and other development partners, it's difficult to make the results of these investments sustainable: the NMHSs are not receiving adequate government funding to retain qualified NMHSs' staff and support operations. This prevents NMHSs from adequately performing their key functions providing services to communities, key economic sectors, and ensure safety of the population*".

In addition to funding NMHSs, the National Governments should also treat their National Hydro-Meteorological Societies (**NMHSoc**), which are run by volunteers, as an important player for Capacity Building. Given the above facts, we believe that one of the best ways for them to build capacity would be to assist these NMHSocs financially and then they can assist their countries in Infrastructure and Educational Capacity Building activities. With financial support from their local Governments, and in the case of developing countries additional

support from International Aid Agencies and philanthropic organizations, NMHSocs can be strong partners of NMHSs.

The assistance for strengthening these NMHSocs is provided by the International Forum of Meteorological Societies (**www.ifms.org**) in the same manner as National Hydro-Meteorological Services are assisted by the World Meteorological Organization (**WMO**) in the coordination of activities and the sharing of knowledge and data. IFMS was conceived to create Science and Technology (**S&T**) collaboration between its member societies. It helps strengthen all societies through S&T collaborations and sharing Best Practices. It also helps in making societies in developing and least developed countries stronger through assistance from

IFMS and, if required, through mentoring by stronger societies. In addition, IFMS endeavors to create new societies in countries where no such society exists but they are large enough to have such a society.

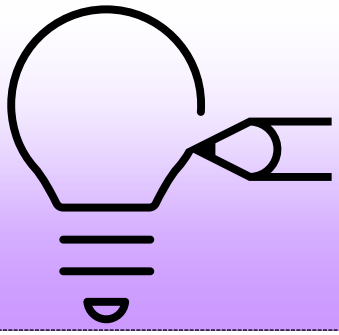
A strong IFMS will be able to assist both WMO and WBG in their mission to build capacity around the world - especially in developing and least developed countries. Therefore, in order to strengthen it, we believe that WMO as well as WBG and donor agencies should invest money in IFMS which is a volunteer-based organization and a small investment will go a long way in their ultimate objective of building capacity in developing and least developed countries against **GW&CC**. In addition, the NMHS should understand that NMHSocs are the other side of the same coin. Being volunteer-based, strong NMHSocs can provide them a strong return on their investment in these societies. Both can work together to create capacity, especially in terms of Education and Training.

It has been observed that the budgets of most NMHSs are not increasing much, whereas, private sector companies in many countries are making strong strides in getting more and more involved in weather-related services and the Academic Sector is also a strong contributor to the Global Weather Enterprise (**GWE**). Consequently, it would greatly help the GWE if the Public, Private and Academic (**PPA**) Sectors could collaborate for the betterment of society at large. WMO and WBG are promoting this Initiative strongly to make it happen. This Initiative was approved by WMO members in its Cg18 Congress in June 2019. Therefore, NMHSs around the world should strongly support this initiative.

Because they work at the grass roots level of the profession and many of them have members from all three PPA sectors, strong NMHSocs can make the best use of any investment to create collaboration between the three sectors as the American Meteorological Society has been doing in the USA since the Fair-Weather Report:

https://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=10610

IFMS' Value Proposition is to strengthen NMHSocs through collaboration with each other and, in order to achieve adequate funding to carry out meaningful activities, assist them in convincing National Governments and International Aid Agencies for funding them so that they can assist their nations more strongly in making them "Weather Ready".



There is no point in dreaming if we do not work hard to make it happen!

Dr Harinder Ahluwalia

Recent improvements in Cyclone Warning Services of India Meteorological Department

R. C. BHATIA

Millions of people living in coastal areas of India are affected every year due to cyclones which cause lot of damage to life and property. India Meteorological Department (IMD) is the nodal Government agency for monitoring of cyclones and issuing alerts/warnings to all concerned. There has been considerable improvement during last 8-10 years in the cyclone warning services provided by IMD.

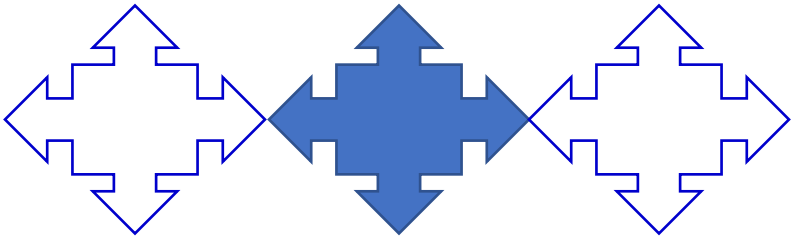
Historically, during last 300 years Bay of Bengal has experienced more than 75 % of the total world- wide cyclones that caused human deaths of 5000 or more. A cyclone that struck Bangladesh (East Pakistan at the time of incidence) coast on 12-13 November ,1970 caused estimated death toll of 300,000 people. Minimizing death toll and damage to property from all weather-related disasters, cyclones in particular, has always been an area of very high priority for IMD. A super cyclone crossed Odisha coast near Paradip on 29 October, 1999 with a wind speed of 260 Kmph causing a death toll of 9885. As a sequel to the review of events in this cyclone, many lessons were learnt which subsequently culminated into focused actions during next 10 years for further reduction in death toll from future cyclones. Emphasis was on R&D work, upgradation of observational networks, adopting best practices and proactive involvement of all users. An Extremely Severe Cyclonic Storm (ESCS) named "Phailin" struck Odisha and adjoining Andhra Pradesh coast on 12 October, 2013 with a wind speed of 215 Kmph. This was the strongest cyclone that hit the eastern coast of India after the super cyclone of October, 1999. A record number of one million people were evacuated from 18,000 villages a few days before the storm struck. This action was taken based on the improved early guidance and precise forecast by IMD. As a result the death toll was restricted to only 21. It was for the first time that such a low figure of death toll had been reported due to a strong cyclone affecting large coastal area.

Encouraged by this significant outcome, IMD continued its efforts to sustain improved services and make further improvements to the maximum possible extent. The old story of large number of deaths due to a cyclone has not been repeated after 2013. The loss of life is limited to double digit figure in almost all cyclones that struck coastal areas during 2014-2019. It was due to highly skilful, accurate and timely guidance provided by IMD for movement, intensity, rainfall and storm surge associated with the cyclones. A crucial factor was proactive involvement of three-tier disaster management agencies at Central, State and district levels in all cyclones.

The above-mentioned success in outcome has been accomplished due to the following actions taken by IMD.

1. A major modernization plan was initiated in 2006-07 for upgradation of observational networks, forecasting, telecommunications and climatological subsystems of IMD. This was implemented successfully in a phased manner from 2008 onwards.
2. Modernization of cyclone analysis and prediction system.
3. Critical review of Standard Operation Procedures (SOPs) for cyclone monitoring and forecasting and their upgradation.
4. Strengthening Institutional mechanisms with various Numerical Weather Prediction (NWP) modelling centres and disaster management agencies.
5. Building Forecast Demonstration Projects (FDPs) on landfalling cyclones over the Bay of Bengal to minimize errors in prediction of cyclone track and intensity forecasts.
6. Generation of new value-added products, their proper presentation in appropriate formats and timely dissemination to the users.
7. Capacity building through training of officers.
8. Introduction of a robust mechanism for forecast verification, preparation of reports and their sharing with all concerned. Such measures are useful for enhancing the confidence of users.

Significant improvements in forecast errors have been observed after implementation of modernization programme in 2009. Landfall Point forecast Errors (LPE) have reduced from 59 and 86 km for forecast lead times of 24 and 48 hours respectively during the period 2010-2014,to 48 and 69 km respectively for the same lead times during the period 2015-2019. Most significant impact of improvements has been drastic reduction in number of deaths from 2013 onwards; e.g., 46 in cyclone Hudhud (2014), 78 in Titli (2018), 64 in Fani (2019), 20 in Bulbul (2019) and 86 in AMPHAN (May, 2020). Improvements in forecast skills have also resulted in reducing the cost of evacuation from Rs.500 crores during Odisha cyclone (1999) to Rs. 1.80 crores in case of Phailin (2013). Ex-gratia paid by Government has also reduced considerably. All users have appreciated the vital role played by IMD in saving lives and property. Hon'ble Prime Minister of India has also appreciated the services provided by IMD in cyclone Hudhud (2014). Success story has once again been repeated in case of NIRAV cyclone that crossed Tamil Nadu coast near Puducherry on 25 November, 2020 night. Lot of lives were saved because of accurate and timely warnings given by IMD and proactive actions by the State Government and other agencies involved in evacuation operations. Precise guidance was provided about possible large threat only to certain specific districts. Disaster management authorities could optimize evacuation operations and save a lot on costs. Death toll was less than 10. There are some difficult situations when cyclone forecasting is still tricky and more challenging. Sometimes cyclones rapidly intensify or weaken near the landfall point. At times their tracks change drastically. Providing guidance in such situations is a challenging task. There is also scope for further reduction in LPE in future by introducing advanced technology. It is planned to reduce LPE to 30, 60 and 90 km by 2030 for forecast lead times of 24, 48 and 72 hours respectively. Cyclone warning services will improve further in the years to come, hence saving more lives, properties and ex-gratia payments.



Announcing Formation of South Asian Meteorological Association (SAMA)

A South Asian Meteorological Association (**SAMA**) comprising 9 countries, Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka was established in August 2020. Presently there are more than 125 members of SAMA including all the 9 countries. An Advisory Committee (**AC**) of SAMA is formed which includes members of all the constituent countries. The activities of SAMA are guided by the AC. The vision, Mission and Objectives of SAMA are summarized below.

Vision: Sharing Knowledge of Weather Without Borders

Mission: Meteorology for the socio-economic development of the region.

Objectives:

- Foster interaction amongst professionals working in Meteorology and allied fields in South Asia.
- Advancement of Meteorological and allied sciences in South Asia.
- Communicate knowledge of such sciences both among the scientific workers and among the public through Citizen Science.
- Application of Meteorology and allied sciences for the socio-economic development of the region.

The International Centre for Integrated Mountain Development (**ICIMOD**), Nepal and the Regional Integrated Multi-Hazard Early Warning System (RIMES), Thailand are the institutional members of SAMA.

The 1st General Body (**GB**) meeting of the members of SAMA was held on 3rd of August 2020 (online), which was followed by the 1st meeting of the AC on 26th August. Based on the recommendations of the GB and the AC meetings, SAMA will organize various educational trainings, workshops, seminars, awareness campaigns, capacity building programs for National Meteorological Agencies, students and research scholars of the South Asian countries. SAMA will form effective Scientific Committees to develop subject-specific research and applications, such as Satellite Meteorology, NWP, Radar Meteorology, Air Pollution, Climate Change, etc. for an overall development of the region. The first international activity of SAMA was the celebration of Ozone day on 16th September 2020 in which more than 22000 students of class VIII to XII of the 9 South Asian countries participated. The celebration included a quiz competition, a webinar and a panel discussion. Certificates were given to meritorious students who participated in the quiz. The event was streamed live through YouTube. The 2nd major activity of SAMA was a webinar on "Monsoon-2020 versus SASCOF outlooks" held on 7th November 2020. Representatives of each member countries presented about the Monsoon-2020 as experienced in their countries versus the SASCOF (South Asian Seasonal Climate Outlook Forum) forecasts. More than 500 people viewed the programme on the YouTube channel.

Climate Services in the Asia Pacific: Emerging Trends and Future Challenges

Chia-Ping Cheng, Hen-I Lin[2], Simon Wang[3] and Kung-Yueh Camyale Chao[4]

Facing the increased climate extremes worldwide, the need for developing climate services is becoming critical for all nations to sustain citizens' quality of life. In the Asia Pacific region, timely and coordinated development among climate services across different countries is paramount. The first Asia Pacific Climate Service Workshop (APCSW) was held in Taipei on 28-29 October 2019 to enhance regional cooperation of governmental and private climate service operations while fostering the interchange of climate service experiences. Participants include more than 20 speakers from 9 countries including meteorological services, disaster prevention agencies, private sectors and academia, along with 100+ local participants to discuss the current trends and future challenges of climate services.

Key messages for future climate services include:

(1) communication in preparing stakeholders for cultivating and utilizing climate services.
(2) steering of policies to improve collaborative partnerships among different agencies;
(3) strengthening of information sharing and co-development.

Speakers also emphasized the role of scientific research in differentiating weather and climate processes and impacts. Many high-impact cases and inspiring experiences regarding weather/climate products were shared. Risk reduction and management are paramount and require tailored solutions. The development of adaptation measure takes multi-governmental and cross-institutional efforts through sectoral partnerships, while international protocols in data and products will speed up these partnerships. The prospect of climate services in creating economic opportunities and enhancing economic values were called upon. The attendees concluded that leadership, communications, and core values are key factors that will enable future climate services to cross political boundaries.

The Full paper was released on BAMS, and you can reach the article as:

https://journals.ametsoc.org/bams/article/doi/10.1175/BAMS-D-20-0093.1/348167/CLIMATE-SERVICES-IN-ASIA-PACIFIC-EMERGING-TRENDS

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Building Capacity by Creating/Strengthening National and Regional Meteorological & Hydrological Societies

Dr. Harinder Ahluwalia and Mr. Workneh Degefu

1 Introduction

One of the major value propositions of the International Forum of Meteorological Societies (**IFMS**) is to strengthen collaboration between National Meteorological Societies (**NMSocs**) and also with Regional Meteorological Societies (**RMSs**). Strong NMSocs collaborating with each other can provide the following advantages:

- Help National Meteorological Services (**NMS**s) greatly in many different ways through their volunteer experts
- Being Volunteer-based, NMSocs can provide much greater return on investment
- Advantages of working with others rather than in silos
- By being members of IFMS, NMSocs can achieve collaboration at international level, share E&T, share Best Practices, share other types of information (e.g., PPA collaboration development) & stay informed, participate in convincing Government to invest more money in this field to create capacity against GW&CC.

There are 193 members of WMO and there are less than 80 NMSocs. Knowing the above advantages of having NMSocs in Capacity Building in various countries, we plan to convince and assist those countries which do not currently have an NMSoc to create one and we will provide assistance in this process. We are also promoting creation of Regional Meteorological Societies (**RMS**) so that NMSocs in the region can have more regional opportunities to collaborate.

10 Why have a NMSoc?

A National Meteorological Society (**NMSoc**) provides a forum for hydro-met professionals to interact with each other and exchange information and ideas about their profession and stay abreast with related Science and Technology (**S&T**). Being volunteer-based, they provide best return on investment and their power and capacity is based on the benefits they can provide, the number of volunteers they can attract and the finances they can arrange. They can provide the following benefits to their members:

1. Enhancement of their network
2. Professional Development through Training Programs, Webinars and Conferences, etc.
3. Broaden knowledge through interactions
4. Professional Accreditation / Certification, if available, otherwise, potentially through RMS
5. Mentoring – get a mentor and make it easier to make decisions in early career
6. Become a mentor and make a difference to the life of youngsters
7. Scholarships for students
8. Guide them to take charge of their career

9. Build a better resume by showing volunteerism and leadership
10. Be a Leader – participate in Committees
11. Make new friends & increase your professional circle and impress pears for career advancement
12. Give back to the community
13. Strength in Numbers – have say in professional matters
14. Stay Inspired and Stay Motivated
15. Participation in International efforts.

NMSocs can provide all these benefits now more than ever before because of their collaboration with other societies through IFMS. Whereas many developing societies were unable to provide regular Webinars, Newsletters, Conferences, Training Material, Best Practices, opportunities for collaboration, etc., collaboration between IFMS members has made it possible – especially because of availability of Internet-based modern tools.

11 Why have Regional Meteorological and Hydrological Societies?

Regional Meteorological and Hydrological Societies have a very important role to play in the Global Weather Enterprise (GWE). Many activities have regional flavor (e.g., climate, language, culture, proximity, etc.) which should be taken care of by Regional Societies. European Meteorological Society is an example of successful Regional Society which is doing a great job of serving Europeans on various aspects of collaboration. They hold an annual Conference, each time in a different country. Similarly, FLISMET - an organization consisting of Spanish and Portuguese speaking nations from Latin America & the Iberian Peninsula (Spain and Portugal) was developed to serve these countries in their own language. However, since its creation, many of its member societies have become inactive. IFMS is assisting FLISMET to re-activate these societies and strengthen FLISMET. Similarly, African Meteorological Society (AfMS) was developed to serve African nations, but it could not survive and continue due to lack of volunteers and finances. We are trying to recreate this society with due attention to getting strong support of heads of NMSs, finding volunteers and finances. We are also working on creating an Asian Meteorological Society for Asian, including ASEAN countries, and a South Pacific Society for South Pacific Nations.

We believe that there is also a need for Subregional societies for larger continents which have a large number of countries e.g., Asia which has 47 countries, Africa which has 54 countries, etc. Thanks to the efforts of Dr. Tyagi and his associates, Asia is building a subregional society called SAMA (South Asian Meteorological Association) which has a membership of Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka. SAMA will be closely working with IFMS to promote meteorology in the South Asia. Capacity building (Education and Training) will be one of the key activities of the SAMA which it will like to coordinate with IFMS. Similarly, Africa plans to have subregional societies for East Africa, Southern part of Africa, North Africa, West Africa, etc. Such subsocieties are formed due to common interests and requirements.

12 Objective of IFMS Committee 3.2

IFMS believes that NMSocs and RMSs are very important components of Global Weather Enterprise (**GWE**) to create capacity around the world in the field of weather and climate to withstand the adverse effects of GW&CC. In order to achieve this, activity we have defined under IFMS a Committee 3 which has two

subcommittees (**SC**). SC 3.1 deals with collaboration between NMSocs and also between their members. The mandate of SC3.2 is to assist in:

1. Creation/strengthening of National Meteorological and Hydrological Societies,
2. Creation/strengthening of Regional Meteorological Societies,
3. Accommodating sub-Regional Met Societies which are created to serve more local interests.

13 How we are going about it

The five most important ingredients for creating a society whether RMS or NMSoc are:

1. *Strong support of the heads of NMSs,*
2. *Financial Arrangements,*
3. *Volunteers,*
4. *Mentoring Assistance,*
5. *Persistence.*

13.2 Seeking Strong support of Heads of NMSs

The sustainability of an NMSoc – especially in developing and least developed countries – is very much dependent upon the support of the head of the National Meteorological Service (NMS) of that country. Without this support, it is very difficult, if not impossible, for such an NMSoc to survive and grow.

It is important for NMSs to be convinced that an NMSoc is required for its (NMS's) own benefit. NMSoc can help NMS in many activities including Education and Training and all the benefits listed in section 2 above for the growth of the profession which is the mandate of the NMS. Being volunteer-based, a reasonable investment by an NMS in its NMSoc can provide disproportionate benefits. Once NMS is made to realize these facts, they should be prepared to support and where it does not exist create an NMSoc.

In the case of RMS, in a well-developed continent like Europe where a number of strong NMSocs exist, the NMSocs themselves can decide to form a European Meteorological Society (**EMS**) and they did. Of course, they have the support of their NMSs because of all the benefits EMS can provide in the development of the European Weather Enterprise. In a continent like Asia where 5 well developed and strong NMSocs (Japan, China, South Korea, Hong Kong and India) exist, it is possible to form an RMS with the consent of these 5 NMSocs and others can be invited to join. However, creation of an NMSoc in those countries where they do not exist requires strong support of the NMS of those countries.

13.3 Fulfilling Financial Requirements

13.3.1 Financial Requirements

Although an NMSoc or an RMS is a volunteer-based organization, it does have a requirement for its most basic requirements such as:

1) Communications requirements: Website, Newsletter, Meeting/Conferencing tools e.g., Zoom, WebEx, Google-Meet, MS Teams, etc.,
2) Organizing capacity building events such as talks, Webinars using tools listed above,
3) Education and Training sessions,
4) Some travel requirements,
5) Small Secretariat with a minimum of one person as Executive Director and for RMSs 2 to 3 persons including Executive Director to support activities,

6) Although many NMSocs use their Conferences as revenue generation activity by charging attendance fee, it depends on the capacity of members to pay. In any case, initial investment is required. In the case of a developing continents, it is possible to have Virtual Conference based on modern Internet-based tools described above in 1) and in the case of the RMS have in mix of in person and virtual conference (for those unable to arrange financial support will do.

13.3.2 Sources of Financing

Each NMSoc needs to decide financial requirements based on the activities it plans to implement. Based on these activities, the NMSoc needs to make a budget.

Financing an NMSoc is always a tricky matter. One has to evaluate all of the following possibilities and follow them up diligently:

1) Governments need to be convinced why they should make that investment in creating and sustaining such societies – directly or through their NMS. The potential benefits have been listed in the previous sections. With so much experience and brainpower available with many societies we need to create a Value Proposition jointly (which can be adjusted by each society for its own use) to be used for convincing the National Government and NMS.
2) Reasonable Membership Fee with special consideration for students
3) Fee for Conferences
4) Donations by individuals and by Private Sector organizations related to the profession.
5) For RMS in developing countries, we will contact various organizations which could provide assistance to such organizations for capacity building. These organizations include World Bank, Regional Development Banks, Philanthropic organizations, Aid Programs of various affluent countries, WMO, etc.

13.4 Volunteer Requirements

We need to have a convincing proposition to recruit Volunteers. IFMS will assist in making that proposition. If the NMS supports its NMSoc strongly, the latter will be able to attract Volunteers from the retired as well as currently active people from public and private sector. One of the most important activities to attract Volunteers is to have a clear definition of the tasks being asked to be executed by Volunteers. There needs to be a Volunteer recognition Program in the NMSoc.

13.5 Mentoring Requirements

In the case of NMSocs, the mentoring function can be performed by existing NMSocs and, if required, IFMS will arrange that. Experienced Volunteers from existing Societies can help in mentoring new societies.

For RMS, mentoring function can be provided by IFMS and other RMSs. For example, for AfMS, we will approach and request EMS for mentoring.

13.6 Persistence

This is a very important characteristic required in those who are leading the effort to create an NMSoc. There could be many hindrances on the way, do not give up. Determination will surely get you there. If you are really stuck, mentoring organizations including other NMSocs with similar experience and IFMS will help you.

14 Steps for Creating a Society & Soliciting Government Assistance & Investment

The steps to create an NMSoc are outlined in a Best Practices document "Establishing a Meteorological Society" created by IFMS. It is available on our website (www.ifms.org) under Resources Tab.

The first important step is to collect a group of capable and motivated people who are interested in having an NMSoc in your country. Discuss the issue with the Head of your NMS.

Organize a Planning Meeting in which try to involve the Head of your local NMS and other important and motivated people from Public, Academic and Private Sectors. With emphasis on collaboration between PPA (Public, Private and Academic) Sectors by WMO and WB, it is important to also involve Private Sector in this venture.

IFMS will help you organize briefings and meetings to convince the head of your NMS to assist in creating an NMSoc in your country. As a result of creating African Meteorological Society, we are inviting all heads of African NMSs. In these meetings we have been able to convince the heads of NMSs to start NMSoc in their country and IFMS will help them in doing so.

Rest of the steps are outlined in the above referenced document.

15 Accommodating Sub-Regional Societies

Sub-Regional Societies in Larger continents can play an important role. Many countries in a give area have lots in common in terms of: weather, proximity, problems faced, language, people characteristics, etc. Therefore, we should support these societies to form Special Interest Groups (SIGs) under the Regional Meteorological Society.

Many countries do not have critical mass for creating a local society. Professionals from such countries can become members of sub-regional societies.

16 Conclusions

In order to strengthen and grow the profession of meteorology in your country, it is important to have an NMSoc which can give all the advantages to its members listed above in section 2.

It is obvious that this effort will require considerable work to establish a society in your country, but IFMS will assist you by providing guidance and pairing you with some existing member society near your country which has gone through similar development steps.

With strong effort by WMO in strengthening Global Weather Enterprise (GWE) by increasing collaboration between the Public, Private and University (PPA) Sectors, the NMSocs can provide an important forum for such discussions. IFMS will provide you guidance on that aspect. In conclusion, we strongly urge you to start a National Hydro-Met Society in your country to strengthen and grow the profession of Hydro-Meteorology.

IFMS Education and Training (E&T) Committee

IFMS is grateful to the following E&T Volunteer Experts

Prof. S.K Dash, Chair
E&T Committee
Retd. Director CAS-IIT

Mr. Ramesh Bhatia
Past President IMS &
Retd. DG-IMD

AVM Dr. Ajit Tyagi
Past President IMS &
Retd. DG-IMD

Prof. Elizabeth Bentley
IFMS -Region 6 Rep.
CEO Royal Met Society

Dr. Harinder Ahluwalia
President IFMS

Mr. Michael Martens
IFMS -Region 5 Rep
President NzMS

Dr. Rattan Datta,
Director at MERIT
New Delhi

Dr. L. S. Rathore
Past President of IMS &
Retd. DG-IMD

Dr. Someshwar Das,
Director at MERIT
New Delhi

Mr. Narayan Gautam
Asst, Professor
Tribhuvan University, Nepal

IFMS Needs many more Volunteer Experts for E&T Committee. Please offer your service by sending an email to ifms.collaboration@gmail.com
Also Need Experts in Spanish, Portuguese, French and other languages

Report on IMS Annual Symposium TROPMET

S.K. Dash[1], D.R. Pattanaik[2], SSVS Ramakrishna[3] and D.V. Bhaskar Rao[4]
Indian Meteorological Society

Indian Meteorological Society (IMS) has the tradition of organizing the Annual Symposium named TROPMET in one of its 32 Local Chapters. Once in every four years, the same event is held as INTROMET with participation of scientists from countries outside India. The very first TROPMET was held in the year 1992. Since then, the theme of this event has been altering from year to year depending on the importance of the topic in contemporary weather and climate science. The main objective of this annual symposium is to provide a platform to the students and early career scientists in India to present the scientific results coming out of their research activities during the year and thereby get chance to interact with the experts in the field.

The symposium is usually structured in such a way that all the members of IMS get an opportunity to actively participate in it either as chairmen of sessions, plenary speakers, invited speaker, oral paper presenter of poster presenter. This annual event has been the flagship event of IMS for the last several years with tremendous success. TROPMET-2019 entitled 'National Symposium on Land, Ocean and Atmosphere Interactive Processes in the Context of Weather and Climate" was organized by IMS at Andhra University, Visakhapatnam during 11th to 14th December, 2019. As per the theme of TROPMET-2019, the main topics identified for the symposium were; (1) Observations in Climate Variability and Changes, (2) Atmospheric Modeling at Regional and Global Scales, (3) Land-Ocean Interactive Processes, (4) Role of Surface Boundary Conditions in Climate Modeling, (5) Climate, Water and Energy Connections, (6) Impact of Climate Variability/Change on Agriculture, (7) Extreme Weather Events, (8) Weather Forecasting Services at Different Time Scales & Sectoral Applications and (9) Impact of Aerosols on Climate Changes.

This IMS symposium was jointly organised along with IMS Visakhapatnam Chapter and hosted by the Department of Meteorology & Oceanography, Andhra University, Visakhapatnam. TROPMET-2019 was inaugurated on 11th December, 2019 at the Convocation Theatre of Andhra University by Dr. M. N. Rajeevan, Secretary, Ministry of Earth Sciences (MoES), Government of India (GoI) as Chief Guest in the presence of Prof. P. V. D. G. Prasad Reddy, Vice-Chancellor, Andhra University who was the Distinguished Guest. Dr. S. K. Dash, President IMS presided over the Inaugural Function. The event took place in the presence of Dr. M. Mohapatra, Director General IMD and Dr. Akhilesh Gupta, Advisor Department of Science and Technology (DST), GoI on the dais. The symposium had the international flavor with the participation of Prof. T. Hayashi, DPRI and Prof. T. Narita both from Kyoto University, Japan; Dr. Michael Caruso, USA and Prof. Ibrahim Hoteit, KAUST, Saudi Arabia.

Prof. S. S. V. S. Ramakrishna, Chairman of IMS Visakhapatnam Chapter welcomed the dignitaries and participants to the event and gave a glimpse of the origin of TROPMET-2019 starting from the proposal to hold it in Visakhapatnam to the detailed scientific programme. Dr. D. R. Pattanaik, Secretary IMS narrated the activities of IMS highlighting the themes of TROPMET-2019. In his opening presidential address, Prof. S. K. Dash,

President of IMS stressed on the importance of Meteorology Education and Training programmes by the local chapters of IMS by organising various courses of different durations targeted towards school children, teachers, stake holders and general public. He mentioned about Global Campus Initiative of WMO and also COMET programme. Prof. P. Suneetha, Head, Department of Meteorology & Oceanography, Andhra University narrated the activities of the department. Dr. Akhilesh Gupta in his remarks, highlighted the contribution of the Department of Meteorology & Oceanography, Andhra University in producing several world class Meteorologists and Oceanographers. He encouraged Andhra University to set up a Centre of Excellence in Climate Studies. Dr. M. Mohapatra reiterated the commitment of India Meteorological Department to Weather Forecasting in particular and Meteorology Education and Research in the country in general and briefly elucidated the measures taken in these directions. Prof. Prasad Reddy in his speech promised that Andhra University will welcome setting up of a Centre of Excellence on Climate Studies if sponsored by the Government of India. He also promised all sorts of institutional support for such an effort.

In his inaugural address, Dr. M. Rajeevan emphasized the need for extensive climate studies since the world is experiencing a sea change in terms of climate change and weather extremes. He expressed the interest of MoES in the growth of weather and climate related activities in India. He congratulated IMS for various types of activities undertaken and also assured all sorts of support for further growth. Finally, Dr. C.V. Naidu proposed vote of thanks. The inaugural function included the presentation of IMS International Award called Sir Gilbert Walker Gold Medal, IMS Fellowships & Associate Fellowships and Annual & Biennial Awards to the young researchers for best papers in published journals. This year, the recipients of Sir Gilbert Walker Gold Medal Award is Prof. R. N. Keshavamurty who is a renowned Monsoon Scientist and the Former Director of IITM, Pune. As per the recommendation of the IMS Fellows Award Committee, four distinguished scientists Dr. Mrutyunjay Mohapatra, Director General of Meteorology, IMD; Prof. S.K. Satheesh, Indian Institute of Sciences (IISc), Bangalore; Dr. (Mrs.) N. Jayanthi, Former, Additional DGM, IMD and Dr. Govindarajalu Srinivasan, Chief Scientist, Climate Applications RIMES, Thailand were presented the IMS Fellowships. From this year, IMD decided to nominate young scientists as IMS Associate Fellows and two of its distinguished young life members Prof. Sandeep Pattnaik, Indian Institute of Technology, Bhubaneswar and Dr. (Ms) Ayantika Dey Choudhury, Indian Institute of Tropical Meteorology, Pune were presented these Associate Fellowships for the first time.

IMS encourages its student members and early career researchers for publishing very good research in various topics relevant to weather and climate in journals of repute and also in its own journal. These awards are named as IMS:

(i) Young scientist award for best paper published on Tropical Meteorology,
(ii) Award for best paper published on monsoon research (Formerly B N Desai Award),
(iii) Award for best paper published on Atmospheric observations and Technology (Formerly J Das Gupta Award),
(iv) Award for best paper published on Weather and Climate Services (Formerly Bhavanarayana Award),
(v) Award for best paper published on Application of Satellite data in Meteorology and Remote Sensing (Formerly P Krishna Rao Award),
(vi) Award for best paper published in IMS Journal VayuMandal. More IMS Awards in the emerging topics of Climate Science and Air Pollution are also being instituted with generous funding from its distinguished Fellows and Senior Scientists.

These awards are decided based on proper advertisement, submission procedure and award committees set up by IMS National Council from time to time. Young scientists look forward to this selection eagerly and try hard to be worthy of getting one.

In the recent years, IMS has been requesting institutions of excellence in the field of weather and climate research and operations to become its Institutional Patron as a mark of respect. IMD, which is the Government Department to officially monitor weather data and give the weather forecasts at all time scales has already become the first Institutional Patron of IMS. This year, IMS thanked NCMRWF Noida on becoming the second Institutional Patron and in this regard a certificate of appreciation was presented by IMS to Dr. E. N. Rajagopal, Head NCMRWF in this function.

Another important activity of IMS in the direction of advancement of education is to encourage senior scientists to write popular science books in the field of weather and climate for easy understanding by the students and even by the non-meteorologists. IMS has already published some books in this series related to Weather Satellites, Numerical Weather Prediction and Radio Meteorology. These books are very much appreciated by students. In continuance of this one of the best practices of IMS, this year the book entitled 'Basics of Atmospheric Dynamics' written by Prof. R. N. Keshavamurty was released at the Inaugural Function along with the recent issue of VayuMandal.

The Visakhapatnam Chapter of IMS begun in the mid seventies with a modest membership. But the Chapter made a good progress with the latest membership standing at 66. The Chapter has always been vibrant with the participation of many student members in the various activities.

A notable feature of this chapter is that three Memorial Lectures have been instituted each in the name of Prof P. Koteswaram, Former DGM, IMD: Prof R. Ramanadham, Former Principal, College of Science and Technology and HOD, Dept of Meteorology & Oceanography, Andhra University and Prof Varanasi P. Subramanyam, Former Professor, Department of Meteorology & Oceanography. The memorial Lectures of Prof P. Koteswaram were given by eminent scientists of India and abroad like Prof Swaminathan, Prof GOP Obasi, Former Secretary General WMO and Prof. T.N. Krishnamurti, Florida State University. Prof. P. Koteswaram Memorial Lecture of this year was arranged after the inauguration of TROPMET-2019 and Dr. M. Rajeevan delivered the lecture on "Global Climate Change: Causes, Concerns and Commitments". In his lecture, Dr Rajeevan enunciated the current status of Climate Change with special reference to India.

During the 4 days of the Symposium, there were 15 Plenary Talks delivered by several eminent scientists which include Dr. M. Mohapatra from IMD, Dr. Akilesh Gupta from DST, Dr. E.N. Raja Gopal from NCRMWF, Prof. S. K. Satheesh from IISc, Dr. G. Srinivasan from RIMES, Thailand, Dr. R. K. Mehajan from DST-SERB, Prof. A. D. Rao from IIT Delhi, Prof. Hayashi from Japan, Prof. Ibrahim Hoteit from Saudi Arabia, Dr. A. K. Sahai from IITM, Prof. T. Narita from Japan, Prof. D. V. Bhaskar Rao from Andhra University, Dr. R. R. Rao from NPOL (Retd) and Dr. K. Rupa Kumar from IITM. Special invited talks were also given by Dr. R. K. Dutta from IMD, Prof. K. Ashok from University of Hyderabad, Dr. A. Suryachandra Rao from IITM, Dr. M.V. Ratnam from NARL, Dr. D. R. Pattanaik from IMD and Prof. Someshwar Das from University of Rajasthan.

There were 260 Oral presentations and 80 poster presentations spread over four days. The organizing committee conducted all the oral presentations under the above said themes in three parallel sessions each equipped with 10x20 LED screen. 40 Poster presentations were arranged every day of the symposium from 12th December, 2019. Of the presentations, majority of them were confined to the themes of Extreme Weather events

(80); Observations in Climate Variability and Changes (71); Atmospheric Modeling at Regional and Global scales (75); This indicates the current research trends in India and that research on the other themes are to be promoted. It was heartening that a sizeable number of researchers from Northeast India actively participated in TROPMET-2009, especially from Kohima University and one of the student participants got the IMS Best Paper Presentation award.

The valedictory function of the TROPMET-2019 was conducted in the afternoon of 14th December, 2019. Sri. N. Sambasiva Rao, Chief Executive Officer-Gangavaram Port, Visakhapatnam was the Chief Guest, and the Distinguished Guest was Prof. V. Krishna Mohan, Registrar, Andhra University. The Organizing Committee distributed the Awards for Best Paper and Best Poster Presentations to the Research Students, Researchers and Young Scientists. All the participants expressed their views and appreciations to the organizing committee for the Grand Success of the TROPMET-2019. Overall, TROPMET-2019 left behind a good example for the next TROPMET-2020 to be held at Shillong. The organization of a big event like TROPMET-2019 which returned to Andhra University after 1996 was made possible and easy due to the extensive support of the Andhra University administration and especially due to the volunteership of the students to look after the arrangements and to see that the conference guests are always comfortable.

The Organizing Committee unanimously thanked the major sponsors of the symposium: MoES, DST, IMD and NCMRWF, The Weather Company IBM and Skymet Weather-wise, and also grateful to the local sponsors: Gangavaram Port and K. Kumar Raja Projects (P) Ltd, Visakhapatnam for their financial supports for successful completion of the mega event TROPMET-2019.

1President of India Meteorological Society (IMS)

2 Secretary, India Meteorological Society (IMS)

3 Chairman, IMS Visakhapatnam Chapter.

4 Chairman, Scientific Committee, TROPMET2019

2019 Awards and Prize Winners Announced by RMetS

Prof. Elizabeth Bentley, CEO Royal Met Society (RMetS)
and IFMS Council Member for RA6

We are delighted to announce the Royal Meteorological Society (RMetS) Awards and Prize Winners for 2019, recognising people and teams who have made exceptional contributions relating to weather, climate and associated disciplines.

This year's awards received some outstanding entries, with recipients being held in high regard across the international community. Due to social distancing guidance, it will sadly not be possible to have a physical presentation ceremony. However, we are taking this opportunity to showcase each of the 18 worthy winners on the RMetS website, outlining their achievements alongside a winner's acceptance message.

The internationally renowned climate scientist, Professor Keith Shine has been awarded the Mason Gold Medal, which ranks alongside the Symons Gold Medal as the premier award of the Society and awarded on alternate years to a Fellow of the Society.

Professor Shine's nomination recognises his substantial contributions to our fundamental understanding of the climate system and his ground-breaking research. His close involvement with the Intergovernmental Panel on Climate Change (IPCC) Scientific Assessments, also included a share in the Nobel Peace prize for his contributions to the 2007 IPCC report. He is a significant voice in the public understanding of climate change and his tireless and selfless support of other scientists has earned him unrivalled respect and several prestigious awards.

Professor Shine said: *"I am delighted to receive the 2019 Mason Gold Medal. Early in my career, the Antarctic ozone hole was discovered. It was a concerning, puzzling, exciting few years; playing some small part in unravelling the mystery was an important formative experience, as was involvement in subsequent national and international ozone assessments. My involvement in early assessments of the Intergovernmental Panel on Climate Change set a lasting direction of travel for my research and teaching.*

So many colleagues and students have played a major role in the scientific journey that has led to this award. Thank you!"

The 2019 Honorary Fellowship has been awarded to former RMetS President, Professor Tim Palmer. As a theoretical physicist and meteorologist, Professor Palmer has led a revolution in the fields of weather and

climate prediction. He has challenged old ideas and has changed the way weather and climate are viewed both by the public, the weather and climate prediction community, and scientists in other disciplines. The techniques he has championed are now standard in operational weather and climate prediction around the world and are central for reliable decision making for many commercial and humanitarian applications.

Professor Palmer said: *"I am truly delighted and humbled to be made an Honorary Fellow of the Society. The Met Soc has been a very large part of my professional life for over 40 years... It was a wonderful honour to have spent two amazing years as President, one that I will always cherish."*

The full list of Royal Meteorological Society awards and winners for 2019 can be found here https://www.rmets.org/news/2019-awards-and-prize-winners-announced.

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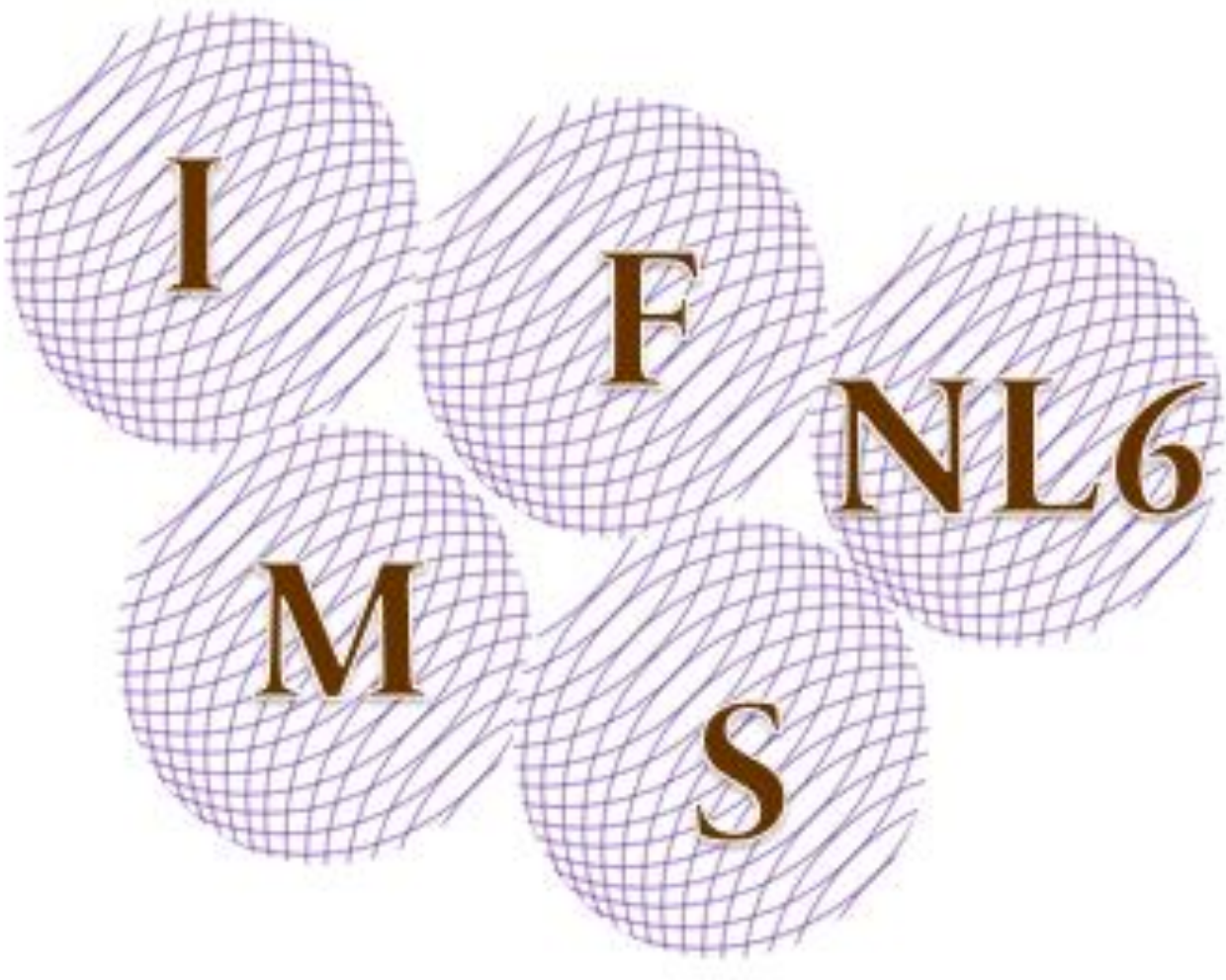


Disaster Management and IFMS

Mr. Narayan Gautam, Society of Hydrologists and Meteorologists-Nepal

Different facts have shown that disasters either natural or manmade are on an increasing trend. It is one of the challenging phenomena especially for developing countries including South Asia. Various relevant institutions/stakeholders have been significantly contributing to reduce disasters in their regions. However, it is expected to achieve significant improvement in disaster management with collaborative efforts. In this case, a remarkable initiation has been done by the International Forum of Meteorological Societies (IFMS) to enhance Education and Training in disaster management especially in water and/or climate induced disasters. IFMS will play a considerable role like an 'umbrella' of various meteorological societies in the world. It is notable to share whoever and/or whatever organization wants to contribute in the disaster management sector, IFMS will appreciate your contribution.

Capacity building program in Nepal

I have consulted different stakeholders of Nepal to enhance capacity building programs through Education and Training (ET), especially in Hydrology and Meteorology fields. I have pin-pointed their feedback with the following points.

1. To know the advancement in Hydro-Meteorological areas in the world
2. Need to be able to handle large numbers of Hydro- Meteorological data
3. It should highlight handling of radar as well as satellite data
4. Need to know effectively working Hydro- Meteorological models along with software for operational purpose in Hydro- Meteorological services
5. Field based as well instrumentation training are required especially for junior level persons along with local citizens.

How IFMS is assisting in Disaster Management

IFMS believes that its mandate is to leverage the strengths of its strong member societies to assist developing and least developed National and Regional Meteorological Societies (**NMSocs**). It plans to identify, and where required, find means of creating, courses in Disaster Management to provide education and training in enhancing infrastructure, knowledge and building institutional and societal capacity through volunteer experts. Due to having membership of almost all NMSocs of the world, IFMS would also leverage its strength to create stronger collaboration with WMO and the World Bank.

In order to ensure that all countries can take advantage of its services, IFMS is working on creating Regional and National Meteorological Societies where no such society exists.

All types of experts are requested to offer their services so that IFMS can provide ever increasing assistance to the National Meteorological Societies and their members.

New Academic Book Series – Developments in Weather and Climate Science

Mr. Narayan Gautam, Society of Hydrologists and Meteorologists-Nepal

We are pleased to announce that the Royal Meteorological Society has partnered with Elsevier on its newly launched academic book series programme - 'Developments in Weather and Climate Science'. This will be a comprehensive series of high-level textbooks and professional reference works covering all aspects of meteorology and related sciences. It will cut across traditional subject boundaries and bring together all the elements that are important in educating students in upper-level study programs. Topics in the series will range from atmospheric dynamics to environmental, oceanic and climatic science and weather forecasting, including the study of recent developments in the field. Elsevier's experience of publishing books in this area, as well as their international reach coupled with the Society's independence and reputation, will ensure an influential global book series.

Paul Williams, Professor of Atmospheric Science at the University of Reading, is the Book Series Editor and is already working with a number of authors on new books to be published in this series. "I am delighted to be editing this new book series in weather and climate science. It benefits from the prestige of the Royal Meteorological Society, of which I have been a Fellow since 2008. That, coupled with Elsevier's global reach in the books market, promises to deliver a world-leading reference series on this vital topic. Having published two books of my own, I have first-hand experience of what is involved, and I am looking forward to guiding authors through the process. I plan to shape the series by identifying critical gaps in the existing literature and soliciting book proposals from leading experts in the field". Prof Paul Williams is already a familiar face with many of our members having been a guest speaker at previous events. You can view his talk - 'Turbulence Ahead! How Climate Change Affects Air Travel', which he presented in July 2018 at our South West Local Centre, in collaboration with the Bath Royal Literary and Scientific Institution.

Please get in contact with Paul if you have an interest in writing a book with the Society.

Does your research span the atmosphere, climate and ecology?

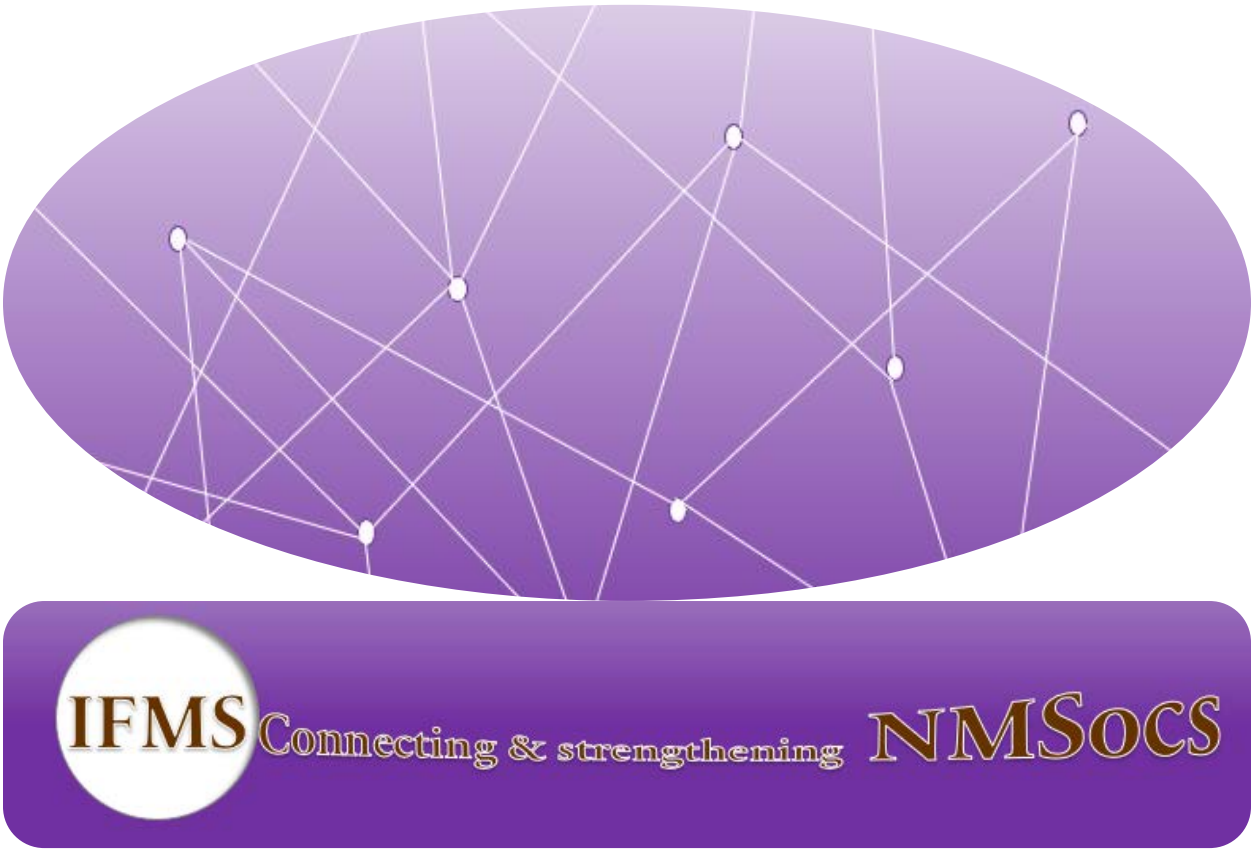
We want to hear from you!

As the home of seven world-leading science journals, the Society works to strengthen the science and raise awareness of the importance of weather and climate, support meteorological professionals, and inspire enthusiasts, and now it needs you.

In light of our changing climate and the emerging ecological crisis, the Society recognizes the importance of interdisciplinary research between these two fields and would like to

invite authors working at the interface between the atmosphere, climate and ecology to publish their research within the RMetS journal portfolio. Next year, the Society is partnering with the British Ecological Society to host the first interdisciplinary conference between climate and ecology. This means that your relevant research papers, appearing in any of our journals, would benefit from additional focused marketing activities surrounding the conference. Don't forget, if you are based at a JISC member institution you are eligible for free open access publication in all of the Society's journals. If you have any questions about submitting a paper, please contact hannah.mallinson@rmets.org.

You can view the full portfolio of journals here.



ANNOUNCING TWO VERY IMPORTANT WEBINARS ON EDUCATION AND TRAINING (E&T)

On January 29, 2021 (Thursday) at 2:00 PM UTC

Dr. Elizabeth Page, Director
COMET Program of UCAR
Presents Webinar on COMET
E&T Approach

Dr. Harinder Ahluwalia, President
IFMS Presents IFMS Approach to
assist WMO & WB in E&T

On February 17, 2021 (Wednesday) at 2:00 PM UTC

Dr. Patrick Parrish, Chief
WMO E&T Program
On Global Campus Initiative of
WMO

Prof. Sushil Dash, Chair IFMS
E&T Program speaks about
IFMS Approach to Support GCI
& COMET

A Volunteer-based Organization Assisting

The World Meteorological Organization (WMO) & The World Bank Group (WBG)

In Strengthening Global Weather Enterprise (GWE) and creating a "Weather Ready Globe"

www.ifms.org

Organizations involved in creating a "Weather Ready Globe"

Weather & Water Related Organizations	WMO	IFMS	HMEI	WORLD BANK GROUP
Beneficiary	National Meteorological Services	National Meteorological Societies	HydroMet Equipment Industry	World's Least Developed & Developing
Financed by	UN	Donations (Volunteer-Based)	Industry	World's Richest Nations

Uniting World's Meteorological Societies to Collaborate and strengthen each other

International Forum of Meteorological Societies - IFMS

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