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New WMO-UNFCCC cooperation agreement

WMO Secretary-General Petteri Taalas and UN Climate Change Executive Secretary Patricia Espinosa signed a Memorandum of Understanding on 6 November, the opening day of Conference of Parties (COP) of the United Nations Framework Convention on Climate Change in Bonn, Germany. The agreement aims to boost cooperation in a number of areas, including on research and evidence to support climate policy-making and climate-smart investment, and on technical development to improve climate products and services for mitigation and adaptation action.

- Strengthening collaboration related to global and region-specific frameworks and mechanisms, including capacity-building at the regional and national levels
- Research and evidence to support climate policy-making and climate smart investment, through science, data, information and knowledge
- Technical cooperation related to data, tools and methods to improve climate products and services and their access for mitigation and adaptation action

The agreement will be complemented by several "component project" annexes, which are currently in preparation.



The WMO Provisional State of the Climate for 2017 was released at COP. It highlights that 2017 is likely to be one of the three hottest years on record, with many high-impact events including catastrophic hurricanes and floods, debilitating heatwaves and drought.

The agreement provides a framework for strategic collaboration between the UN Climate Change Secretariat and WMO in the areas of mitigation, adaptation and awareness-raising with respect to:

- Communication campaigns that improve understanding of, and motivate action on, climate change and sustainable development priorities
- Strengthening climate change leadership and engagement at the global, regional and national levels

Enhancing seasonal forecasts in the Western South America

WMO and IDEAM (the Colombian NMHS), with additional support from USAID, convened a technical workshop in Bogota, Colombia, from 30 October to 1 November with the aim of identifying the technical and scientific barriers in national prediction systems that prevent the full exploitation of climate information in support of climate risk management. The workshop defined steps to improve capabilities to deliver climate prediction products to meet the needs of economic sectors such as agriculture, water and energy.

Advances in research permit the development of reliable seasonal forecasts of hydrometeorological parameters, information that is useful for a number of climate-sensitive economic and social sectors. Through the Global Producing Centres for Long Range Forecasts (GPCLRFs) and the Regional Climate Centres (RCCs), including facilitating mechanisms such as Regional Climate Outlook Forums (RCOFs), WMO has established operational infrastructures to make seasonal forecasts on global and regional scales available on a regular basis. The imperative is now to put systems in place at the national level to maximize the use of these to produce calibrated seasonal forecast products tailored to economic and societal sectors sensitive to climate variability and change.

The workshop was guided by a previous assessment conducted by the International Centre for Tropical Agriculture that mapped existing

climate services in Colombia as part of an international initiative led by USAID. Key stakeholders – representing public and private sectors, civil society and academia – joined the experts in seasonal and sub-seasonal forecasting and representatives of IDEAM, DMC (the Chilean NMHS), SENAMHI (the Peruvian NMHS) and CIIFEN (a WMO RCC) for the first day of the workshop to present their climate data and information needs.

The second day of the workshop was dedicated to the exploration of internationally-used methods and tools for producing seasonal forecasts at regional and national levels. Emphasis was placed on the verification of the quality and the confidence of the seasonal prediction. CIIFEN also made its regional climate information portal available to support national climate services.

The workshop defined a set of actions to guide the implementation of an improved seasonal forecast system for Colombia to make better use of global and regional seasonal prediction model products statistically-downscaled to the national level and enhanced by national data to support country level decision-making. This implementation plan will be part of a regional proposal to the Adaptation Fund to be submitted in 2018 by Chile, Colombia and Peru, which will focus on calibrating seasonal forecasts for users to make better decisions in key sectors such as agriculture, energy and water management.

The WMO Science Summit

The WMO Commission for Atmospheric Sciences held a Science Summit on Seamless Research for Weather, Climate, Water and Environment at WMO headquarters in Geneva from 20 to 22 October. The Summit defined a new framework for collaboration to achieve urgently needed breakthroughs in our understanding of the Earth system and to transform knowledge and technologies into concrete services for humanity.

The Summit focused on five topics identified as crucial for the years to come:

- **Seamless prediction in 2023** - improving predictive capacity across weather, climate, water and environment
- **Future infrastructures** - planning and investing in future infrastructures (computing, data-handling, observations)
- **Science for services** - developing and implementing a new interactive model for integrating research and operations
- **Nurturing scientific talents** - guaranteeing the sustainable development of science; breaking through geographical, gender and age barriers; ensuring institutional continuity and transfer of knowledge
- **Innovation and resources** - Catalyzing innovation and mobilizing resources in weather, climate, water and environment research globally and locally.

The Summit created an inclusive, informal and interactive forum for leading scientists from academia, the WMO community and the private sector, as well as the representatives of funding agencies, to prioritize the key issues to be addressed in the five areas. Keynote addresses, panel discussions and breakout group debates permitted the participants to share thoughts on how to promote both local and

global exchange across the multiple disciplines related to Earth system sciences. In so doing, the Summit participants could outline a new framework for scientific cooperation in support of weather, climate, atmospheric composition and related environmental research and its translation into new and better products and services.

The Summit outcomes fed directly into the Commission for Atmospheric Science assembly, which took place immediately after the Summit, and will guide the proposals of the Commission to the 2019 World Meteorological Congress. More details on the outcome of the Science Summit will be made available in a set of upcoming publications.

HKO, a “Centennial Observing Station”

WMO Secretary-General Petteri Taalas awarded a certificate to the Hong Kong Observatory (HKO) on 18 October officially accrediting it as a WMO Centennial Observing Station. The certificate was presented to HKO Director Shun Chi-ming, at WMO headquarters in Geneva.

In order to promote the rescue, preservation and continuation of long-term climate records, in 2016 WMO started providing formal recognition to stations nominated by governments as Centennial Observing Stations. Taken together as an international network, these stations are able to tell a unique story of recent climate history.

The Hong Kong Observatory has been collecting regular meteorological observations at its headquarters since 1884, documenting how the climate has varied over the years due to both man-made climate change and the effects of local urbanization. These data are an invaluable source of climate information for Hong Kong and the world.

Sixty stations around the world have been accredited. The full list is available at public.wmo.int/en/our-mandate/what-we-do/observations/long-term-observing-stations

Building HydroSOS

Leading hydrologists from around the world met in Entebbe, Uganda, from 26 to 29 September to discuss a four-year plan to implement the WMO Hydrological Status and Outlook System (HydroSOS), which will be capable of assessing hydrological variability on a global scale. The group also looked at how HydroSOS can help deliver the United Nations Sustainable Development Goal 6, which stresses the importance of attaining human health, environmental sustainability and economic prosperity through access to safe water and sanitation, and sound management of freshwater ecosystems.

Currently some 20 million people around the world are at risk from flooding, but that figure could rise to 50 million in the next 15 years according to the World Resources Institute. The World Economic Forum estimates that the effects of drought across the globe cost up to US\$8 billion a year from losses in agricultural and related businesses. However, there is no global hydrological monitoring, modelling and reporting system to warn of impending flood or drought situations. HydroSOS will use a combination of local ground-based data, global scale remotely-sensed satellite data, global/regional/national weather and climate forecast models and global hydrological models to help inform government bodies, regional and international aid agencies, and affected populations through their NMHSs of expected flood or drought risks.

“HydroSOS builds on WMO initiatives on hydrological monitoring, data sharing and seasonal meteorological and hydrological forecasting to deliver accessible and actionable hydrological information, especially for flood and drought impacted populations,” said Johannes Cullman, Director of the WMO Climate and Water Department.

National Adaptation Plans, Vehicles for climate service implementation

Over the last months, WMO has led sessions in a series of regional training workshops designed to support countries in advancing their National Adaptation Plans (NAPs), key instruments for scaling up climate action under the United Nations Framework Convention on Climate Change (UNFCCC). The WMO aims to help the countries to benefit from scientific information on climate variability, trends and extremes and to demonstrate how these can be imbedden in their sustainable development strategies, so that they serve as vehicles for implementing the climate services needed to achieve the best possible climate-related development outcomes.

The first workshop in Seoul, Republic of Korea, in September focused on mainstreaming climate change adaptation into water resources. Over 50 policymakers and technical specialists from 20 countries in Asia attended. “Asia is the world’s most vulnerable region for water insecurity, impacting approximately 75% of the population. There is no doubt that climate change adaptation is crucial to water management,” said Young-hoon Kim, Director-General of Climate and Future Policy Bureau, Ministry of Environment, Republic of Korea.

The second workshop was held in Abidjan, Cote d’Ivoire, from 17 to 19 October to support their medium-to long term climate change adaptation planning processes. Over 20 delegates from 12 countries in Africa attended. In her keynote speech, Anne Desirée Ouloto, Minister for Urban Sanitation, Environment and Sustainable Development, emphasized the need for such capacity-building efforts in the region, “It is evident that successful climate resilience requires good planning and prioritization. However, our countries lack the technical, technological and financial capacity to effectively mainstream climate change into the national and local planning process.”

The workshops are part of the National Adaptation Plan Global Support Programme (NAP-GSP), led by the United Nations Development Programme and the United Nations Environment Programme, and financed through the Least Developed Country Fund of the Global Environment Facility. NAP-GSP assists countries with medium and long-term climate change adaptation planning and budgeting.

New working arrangement for AMDAR

WMO and the International Air Transport Association (IATA) established a new Working Arrangement on the Operation of the Aircraft Meteorological Data Relay (AMDAR) Programme in July. It commits the two organizations to develop a business case and framework for future collaboration on the operation, expansion and enhancement of AMDAR.

AMDAR automates the measurement and transmission of meteorological data from an aircraft of participating airlines to NMHSs. Such data is of high value to the global meteorological community as it enhances forecasting accuracy for all users of weather services, including aviation.

AMDAR is a key component of the WMO Integrated Global Observing System (WIGOS). It has been operating successfully in Europe, North America, Asia and Oceania for years. However, there are gaps in the AMDAR network in Central and Northern Africa, areas of Eastern Europe, Western Asia, the Southwest Pacific and the Middle East, and limited funds available for further expansion.

Having formalized the Working Arrangement, WMO Secretary-General Petteri Taalas and IATA Director General Alexandre de Juniac discussed how IATA’s 265 airlines, which cover over 117 countries, can best contribute to AMDAR. Forty airlines presently relay around 700 000 aircraft-based observations per day through AMDAR, so there is a potential to at least double the number of participating carriers. An initial draft Concept of Operations (ConOps) for AMDAR is expected for review by both organizations at the end of 2017.

IATA and WMO will also evaluate the feasibility of establishing an AMDAR Programme Expansion Fund (APEF) to cover developmental and ongoing costs associated with the participation of airlines in regions with least developed countries. The fund would not only be based on contributions from participating AMDAR countries but also on contributions from other donor sources that support least developed countries.

The IATA and WMO collaboration would expand AMDAR to new geographical areas while introducing measures to give participating airlines better control over and access to the data they provide. It would thus extend and broaden the benefits that this public-private partnership provides to the meteorological, aviation and wider public communities.

Enhancing climate resilience

MeteoSwiss and the University of Bern co-convened a session at the 4th International Conference on Research for Development (ICRD) from 5 to 8 September to exchange experiences on how to enhance climate resilience of for the poorest in our societies who are often unprepared for and have limited possibilities to cope with the impacts of climate change and variability. Such climate services could also provide financial benefits to the stakeholders in question. A study within the Climandes[1] project, which is financed by the Swiss Agency for Development and Cooperation (SDC), demonstrated that for coffee and maize the return on investments on an early warning system for high-impact weather and climate events would be more than US\$ 100 million over 10 years in Peru.

Keynote speeches, a panel discussion and posters emphasized that the success and sustainability of climate services largely depends on strategic partnerships between suppliers, users, government and civil society. However, it is vital to define the roles and required capabilities of each partner.

High-quality climate data is the foundation for climate services. But many developing and emerging countries lack the resources for collecting and processing such data – measuring infrastructure or data management capabilities. Governments need to prioritize this area and seek out international cooperation to strengthen national services.

Climate services are also only valuable if they are used, and they will only be used if they fit the user’s needs. The engagement of users in the development, dissemination and application of climate services can dramatically improve their fitness-to-purpose. Social sciences

can play an important role in understanding how decisions are made in a society and in so doing can determine entry points for climate service delivery.

Cognitive and cultural differences can furthermore constrain the use of climate services. An incident in Peru is a point in case: "Local farmers destroyed a measuring station, assuming it prevented the rain, which exemplifies that cultural translators are needed" said Mario Rohrer, managing director of Meteodat. Nongovernmental organizations that are close to local communities and experienced in making complex scientific content comprehensible for them can play a key role in this area.

Fulfilling these roles correctly will improve the supply and use of climate services and make them mainstream. Initiatives involving qualified and equally integrated key stakeholders (from society, science, government and economy) are more sustainable because wide-ranging needs are addressed. A set-up of this kind allows effective production, tailoring and communication of climate services for the benefit of vulnerable societies.

TAHAK – A two-way communication

The Islamic Republic of Iran Meteorological Organization (IRIMO) initiated a comprehensive climate information services project in 2104 called TAHAK, which focuses on farming communities. The project aimed to minimize quantitative and qualitative losses of agricultural products, to reduce damages due to weather and climate hazards, to fill gaps in information systems, and save time, energy and financial resources. TAHAK was implemented using the WMO Strategy for Service Delivery.

Local observers of synoptic weather stations contribute to TAHAK implementation by producing value added information based on in situ meteorological data. They serve as TAHAK county representatives, bridging the gap between farmers and IRIMO and paving the way for further implementation of TAHAK by delivering applicable meteorological information and practical tips to farmers. A two-way relationship between meteorologists and end-users is key to the success of TAHAK. Both end-users and meteorological experts received training to ensure uniformity in the implementation of the system.

Over the past three years (2014-2016), over 1.2 million farmers in the 31 provinces of Iran have been involved in the project. They cover agricultural fields such as beekeeping, shrimp producing, olive, date, apple, grape, wheat and rice growing, poultry and ostrich farming, and many more. TAHAK services in 11 provinces were estimated during the last growing season (2015-2016) at US\$ 110 million.

TAHAK is expanding to other sectors, including health and air pollution. The project is currently setting-up automated production and delivery of user-centric services for agricultural meteorology and other sectors.

Call for proposals for climate services for Africa

The European Commission has issued a call for proposals for "Building a low-carbon, climate resilient future: climate action in support of the Paris Agreement." This call falls under Horizon 2020, the largest European Union Research and Innovation programme with close to €80 billion in funding available over seven years (2014 to 2020).

One of the topics included in the call is "Human dynamics of climate change." in order to respond to the need for adaptation support in less developed countries. Populations in those countries are under pressure and could greatly benefit from bespoke climate services tailored to their needs to improve their resilience to climate variability and change. Actions that specifically address climate services in Africa are sought – particularly those that consider and add value to activities addressed by initiatives such as the Global Framework for Climate Services (GFCS) and Copernicus.

Such actions should take advantage of new climate data made available by Copernicus and other sources, and create dedicated climate services for Africa for at least two of the following sectors: water, energy, land use, health and infrastructure. The tools and applications developed must demonstrate clear end-user engagement, consultation and participation, and enhanced planning and implementation of climate adaptation strategies in Africa.

The opening date is 14 November 2018 and the deadline for the first stage is 19 February 2019.

Maintenance keeps radars running

The policies and practices of radar maintenance have not been widely discussed in the international radar community. Thus, the members of the European radar project – Operational Programme for the Exchange of Weather Radar Information (OPERA) – have shared their experiences an article published in Bulletin of the American Meteorological Society (BAMS), which we invite you to read at <http://journals.ametsoc.org/doi/pdf/10.1175/BAMS-D-16-0095.1>

Obituary

An obituary for our colleague, Ms Bharti (Pat) Calutas, former Senior Secretary in the Ocean Affairs Division, is available in the online version of MeteoWorld.

We welcome your comments about MeteoWorld and look forward to hearing from you: editor@wmo.int

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