World Meteorological Organization
Weather • Climate • Water

60 Years of International and Regional Cooperation in Meteorology

Meteorological Network Plays Pivotal Role in Disaster Risk Reduction

During the period 1980-2007, about 90% of disasters were caused by recurrent meteorological-, hydrological- and climate-related events such as droughts, windstorms, tropical cyclones and storm surges, floods and landslides, extreme temperatures, or by forest fires, health epidemics and insect infestations, which are linked to meteorological and hydrological conditions[1]. According to the Intergovernmental Panel on Climate Change Fourth Assessment Report, the frequency and intensity of hazards will increase as a result of climate change.

Over the years WMO, a specialized agency of the United Nations, has acted as an authoritative voice for weather, water, climate and disasters of hydrometeorological origin, and has promoted the importance of prevention and preparedness measures, including risk assessment, early warning systems, and sectoral planning, to reduce the impacts of weather-, climate- and water-related hazards.

Components of the WMO coordinated Operational System

WMO coordinates a network of the National Meteorological and Hydrological Services (NMHSs) of its 189 Members which operate:

(1) The WMO Global Integrated Observing System enables the collection of data from 17 satellites, hundreds of ocean buoys, thousands of aircrafts and ships and nearly 10,000 land-based stations;
(2) The WMO Global Telecommunication System is composed of a dedicated network of surface and satellite-based telecommunication links and centres operated 24/7 all year round. It interconnects all NMHSs for collection and distribution of all meteorological and related data, forecasts and alerts, including tsunami and seismic related information and warnings. Daily more than 50,000 weather reports and several thousands charts and digital products are disseminated through the GTS;
(3) The WMO Global Data-Processing and Forecasting System involves three World Meteorological Centres and 40 Regional Specialized Meteorological Centres. They process data and routinely provide countries with analysis and meteorological forecasts, supporting early warning capacities through the NMHSs. In addition, WMO supports 30 Regional Training Centres, providing technical training for management and operations of the NMHSs.

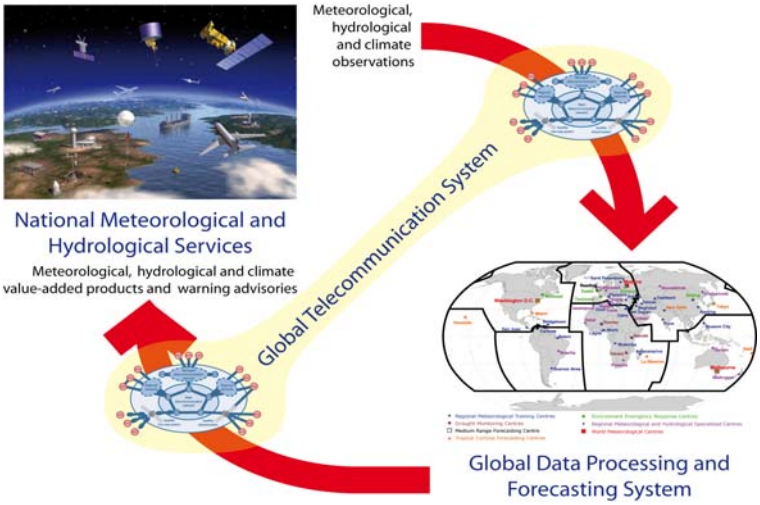

Figure 1: Internationally coordinated network of WMO involving Global Observing System, Global Telecommunication System and Global Data Processing and Forecasting System facilitating sharing of data, analysis and forecasts across 189 WMO Members through their National meteorological and Hydrological Services.

Building on this network, WMO is working with its Members to strengthen and establish new Regional Climate Centres and Regional Drought Management Centres. To date, Regional Climate Centres have been established in Beijing (China), Tokyo (Japan), and a pilot phase is being introduced in Europe and Africa. Africa has established two drought monitoring centres and a regional drought management centre for South-eastern Europe has been set up in Slovenia in collaboration with the United Nations Convention to Combat Desertification.

Tropical Cyclone Programme

The Tropical Cyclone Programme is an example of cooperation using regional capacities to support national warning systems to promote disaster risk reduction strategies. Through the Programme, six Regional Specialized Meteorological Centres are dedicated to providing tropical cyclone analysis, forecasts and alerts in support of

[1] According to data from the Centre for the Epidemiology of Disasters (CRED)

National Meteorological Services' operational warnings. The Programme is supported by five regional committees, involving forecasters from the NMHSs, which ensure ongoing improvements in the tropical cyclone forecasting and warning systems. This has enabled availability of tropical cyclone warning capacities to all countries at risk.

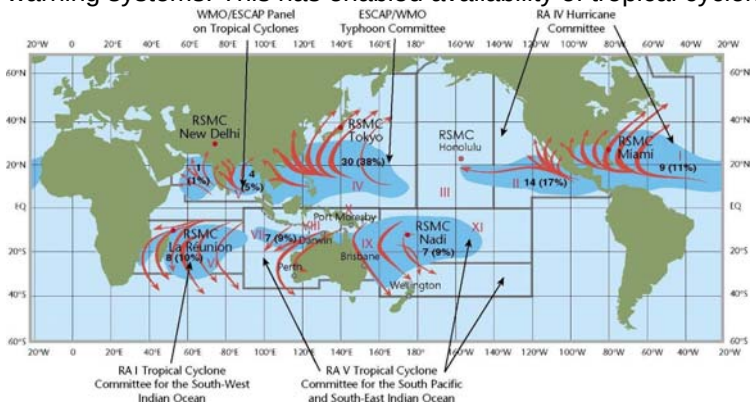

Figure 2: WMO network of tropical cyclone specialized centres, a model for sustained cooperation.

Emergency Response Activities

The WMO programme of Emergency Response Activities (ERA) established in 1986 to assist NMHSs, governments and international organizations to respond effectively to environmental emergencies with large-scale dispersion of airborne hazardous substances is another example of regional cooperation. The programme is focussed on nuclear facility accidents, but also provides for meteorological support in emergency response to the dispersion of smoke from large fires, volcanic ash, dust and sand storms and chemical releases from industrial accidents. The WMO operational network of global, regional and national meteorological centres provides the infrastructure for specialized atmospheric dispersion-modelling that play a crucial role in assessing and predicting the spread of air-and water-borne hazardous substances.

Nuclear Accidents

The Chernobyl nuclear accident (April 1986) led to strengthened international cooperation in the event of a nuclear emergency through the Joint Radiation Emergency Management Plan of the International Organizations. The plan is coordinated by the International Atomic Energy Agency in cooperation with international organizations including WMO, the World Health Organization, and the Food and Agriculture Organization. WMO maintains a system of eight Regional Specialized Meteorological Centres which provide highly specialized computer-based simulations of the atmosphere that predict the long-range movement of airborne radioactivity to support environmental emergency response, when needed. These centres, which provide complete global coverage 24 hours a day, every day, are located in Beijing (China), Obninsk (Russian Federation) Tokyo (Japan), Exeter (United Kingdom), Toulouse (France), Melbourne (Australia), Montreal (Canada) and Washington (USA). This response system was activated on 12 March 2011 in the aftermath of the earthquake in Japan.

Volcanic ash

Volcanic ash is a direct safety threat to jet transport aircraft, primarily because the melting point of ash is around 1100°C, while the operating temperatures of jet engines are around 1400°C. The ash melts in the hot section of the engines and then fuses on the turbine blades, eventually leading to engine stall. The International Civil Aviation Organization is responsible for coordinating the efforts of its member states and seven international organizations, including WMO, which comprise the International Airways Volcano Watch (IAVW). Under the IAVW, international ground-based networks, global satellite systems and in-flight air reports detect and observe volcanic eruptions and ash cloud and pass the information quickly to appropriate air traffic services units and Meteorological Watch Offices, which provide the necessary warnings to aircraft before or during flight. The warnings are based on advisory information supplied by nine Volcanic Ash Advisory Centres (VAACs) designated upon advice from WMO. The designated VAACs are located in Anchorage, Buenos Aires, Darwin, London, Montreal, Tokyo, Toulouse, Washington and Wellington.

Wildfires

Following the worst smoke and haze episodes that affected South-East Asia in autumn 1997, which impacted many socio-economic sectors including civil aviation, maritime shipping, agricultural production, tourism and the health of populations, WMO joined with the Association of South-East Asian Nations (ASEAN) to set up the ASEAN Regional Specialized Meteorological Centre in Singapore. This Centre provides smoke/haze information and forecasts to NMHSs to assist in environmental emergency situations. It also displays weather and hot spots using satellite images on its website. Satellite imagery can provide information on the dryness of vegetation, location and size of major fires and smoke plumes, energy released by fires, and air pollutants in the smoke plumes.

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