WORLD METEOROLOGICAL DAY 2004

WEATHER, CLIMATE AND WATER IN THE INFORMATION AGE

Message from Mr M. Jarraud
Secretary-General of WMO

World Meteorological Day 2004 celebrates the entry into force on 23 March 1950 of the Convention creating the World Meteorological Organization (WMO), as the successor to the International Meteorological Organization (IMO) established in 1873. For this Day, the theme "*Weather, climate and water in the information age*" is selected in recognition of the vital role of technology in advancing meteorological, hydrological and related geophysical sciences that enable National Meteorological and Hydrological Services (NMHSs) to contribute to socio-economic development and to the protection of the environment. WMO therefore relies on, and actively promotes, the application of such technologies to the monitoring, understanding and prediction of the behaviour of the atmospheric and oceanographic systems and the water cycle.

Today, the world is changing faster than ever. There is greater awareness of the sensitivity of the economy to weather, climate and water that influence virtually all human activities. For example, there is growing concern about the impact of natural hazards. Statistics over the last decade show that over 80 per cent of all natural disasters are of meteorological or hydrological origin. In the 1950s, losses from all natural disasters, including those of hydrometeorological origin, earthquakes and volcanic eruptions, were estimated at US$ 4 billion per year and in the 1990s at US$ 40 billion. More than 65 per cent of these losses and nearly 90 per cent of people killed were due to weather-, climate- and water-related disasters, with more than 280 000 deaths attributable to drought in the 1990s. Unfortunately, the burden of the associated impacts falls disproportionately on developing countries.

Indeed, at no time in history has so much been expected from the sciences of meteorology, hydrology and related geophysical sciences in addressing the challenges associated with sustainable development in areas such as disaster mitigation, food security, water resources management, transportation, tourism and pollution control. This is largely due to spectacular achievements of these sciences over the past few decades. They have shored up the confidence of meteorologists and hydrologists in the value of their products and those of decision-makers, the public and other users in the capability of the systems, operated under the aegis of WMO, to deliver and live up to expectations. Some of the major advances that have led to such assurances arise from the context in which these sciences evolve and include:

- The availability of an unprecedented amount of new non-traditional observations, in particular from satellites;

- The considerable progress in scientific understanding of dynamical and physical processes in the atmosphere and its interaction with the oceans and various other elements of the Earth's system;

- The unprecedented improvement in the quality and accuracy of numerical weather prediction (NWP). As a result, five-day forecasts today are as good as two-day forecasts about 20 years ago and the forecasts over the northern and southern hemispheres are of similar quality. This is one of the major success stories of the second half of the 20th century in all scientific disciplines;

- The ability to forecast the occurrence of El Niño and La Niña and the associated impacts over various parts of the world over a time-scale of a season to a year in advance;

- The ability to make climate projections on a time-scale of decades. This has contributed to climate-change studies and to the assessments of the WMO/UNEP Intergovernmental Panel on Climate Change.

These achievements have been possible primarily due to major scientific breakthroughs and technological developments in observing, telecommunications and computer capability. It is recalled that progress in telecommunications and information technology made it possible to launch WMO's World Weather Watch (WWW) in 1963. Today, WMO coordinates the making of observations, using both traditional and state-of-the-art monitoring systems, including automatic weather stations, weather radars, and meteorological operational, as well as research and development satellites.

Apart from monitoring the ocean through ships and buoys, WMO sponsors the deployment of more technologically advanced measurements, which contribute to improving the understanding of air-sea interactions and the provision of services for marine users. For example, profiling floats (Argo floats) give temperature profiles down to 2 000 metres in the ocean, measure subsurface currents, and transmit accumulated data by satellite relay.

Another benefit of the information age relates to the monitoring of the water cycle and water quality using up-to-date technologies and scientific developments. This is essential in water resources assessment and management, flood forecasting and the wise and equitable use of fresh water across frontiers to address the increasingly acute problems of fresh water supplies and management. For this purpose, observations of precipitation, stream flow and water level are now often transmitted by satellite relay to the central offices of National Hydrological Services or Water Agencies for processing. These new capabilities should place the National Hydrological Services in good stead to address the challenges of growing water scarcity. Present estimates indicate that more than one billion people do not have ready access to safe drinking water. This is projected to get worse with urbanization and population growth.

As regards environmental protection, WMO's Global Atmospheric Watch (GAW) monitors the chemical composition of the atmosphere including greenhouse gases, the ozone layer and ultra-violet radiation, as well as long-range transport of pollutants, aerosols, reactive gases and radioactive isotopes. The programme integrates monitoring with research and operates an early warning system for changes in the atmosphere. In this respect, WMO coordinates a global network of Regional Specialized Meteorological Centres to respond effectively to human-induced and other environmental emergencies, including nuclear or chemical accidents.

These modern systems of observations, supported by powerful computers and telecommunications facilities, have enabled the development of Numerical Weather Prediction (NWP) techniques that have permitted significant improvements in real-time forecasts of various types of weather phenomena. As for severe tropical storms, for example, forecasts and warnings involve satellite images for detection and tracking, computer models of the atmosphere-ocean system to predict their

intensification decay as well as their trajectory and up-to-date telecommunication facilities for dissemination to all categories of users. Steady improvements in predictions of tropical cyclones up to three days in advance, effective dissemination of warnings and preparedness measures have led to a dramatic decrease in related deaths.

In the case of small-scale severe thunderstorms and tornadoes, specific warnings are possible only a few hours, or even minutes, before the damaging storms strike. Even for that critical short period, warnings now rely on the technology of Doppler radar to detect the whirling winds, skilled forecasters, high-speed telecommunications and effective radio and TV contacts, to transmit the warnings to the affected communities.

Improvements in quantitative precipitation forecasts contribute to more effective scheduling of water uses, integrated water management and warnings of floods. The overall objective of WMO is to ensure that every nation, whatever its level of economic development, should be able to access and adapt the available forecasts and information for their basic national needs.

There is also growing recognition of the economic and social value of weather and climate as a resource. Indeed, weather, climate and water information are vital for most socio-economic activities. For example, weather and hydrological forecasts are used, among others, to enhance agricultural production, manage water resources, combat desertification, ensure safe and efficient transportation, control pollution, schedule the production and distribution of electricity, support leisure activities and the insurance industry.

The new technologies are essential in addressing some of the major challenges of this century. Without information technology and associated development in meteorology, there is little likelihood that the world community would be aware of the increasing greenhouse gases and their implications for climate change, ozone depletion and environmental pollution and far less able to develop, implement and monitor strategies that could fully achieve environmental protection through instruments such as the United Nations Framework Convention on Climate Change (UNFCCC), the Vienna Convention on the Protection of the Ozone Layer and its Montreal Protocol, the UN Convention to Combat Desertification and the Convention on Long-Range Transboundary Air Pollution.

The opportunities offered by the 'Information Age' to meteorological, hydrological and related geophysical sciences should enable WMO and the NMHSs of its Members to address a growing number of challenges that relate to improved protection of life and property through better preparedness and vulnerability assessment as well through contributions to sustainable development and poverty reduction. WMO can contribute to meeting the challenges of the 21st century through the promotion of applications of new and affordable technologies to:

- Further strengthen WMO's scientific and technical programmes through improvement and modernization of infrastructure, including observing, telecommunications and data-processing facilities;

- Ensure a more integrated approach to observation across networks such as those of WMO's WWW, GAW and hydrology and those co-sponsored by WMO such as the Global Climate Observing System; and across disciplines including terrestrial and oceanic, with emphasis on satellite observations;

- Place new emphasis on research in areas such as NWP, where further breakthroughs are expected in a number of directions, including further development of the Ensemble Prediction System (EPS) with resulting improvement in seasonal forecasts. WMO's World Weather Research Programme (WWRP) will bring significant benefits from improved forecasts of high-impact weather. A major challenge will be to transform research results into operational applications. Climate research, primarily through the WMO-sponsored World Climate Research Programme (WCRP), holds promise for long-term strategic planning. However, developing countries should be further involved in research activities;

- Promote a more integrated, coordinated and synergetic approach to cross-cutting issues such as disaster prevention and mitigation, climate, and water resources management;

- Enhance partnership and strategic alliances among WMO Members, between NMHSs and other institutions nationally and internationally, and across domains and disciplines to build better synergy among all interested parties;

- Enhance visibility through improved communication with partners, including the media, academia and the private sector;

- Seize opportunities for capacity building through appropriate strategies at national and international levels and with development partners.

In order to address these challenges successfully, it is my hope that this year will mark wider recognition of the need to modernize National Meteorological and Hydrological Services. For this reason, I would call on national authorities, the scientific communities, partner organizations, non-governmental organizations, the private sector and the public to ensure that, along with the modernization of the NMHSs, they are also equipped with the necessary facilities to access and use the information provided under the umbrella of WMO in meeting effectively the environmental and developmental challenges of the 21st century.
