Mr Chairman,

Distinguished Secretary-General of the United Nations,

Your Excellencies,

Distinguished guests,

Ladies and Gentlemen,

It is indeed an honour and a privilege for me to address this Forum, on a subject of increasing concern to humanity. On behalf of the World Meteorological Organization (WMO) and on my own, I wish to thank the organizers of this Forum and particularly, Mr Philippe Boullé, the Director of the International Decade for Natural Disaster Reduction (IDNDR) Secretariat, for inviting me to address the Forum. It gives me great pleasure to also express my thanks and appreciation to Mr Kofi Annan, the Secretary-General of the United Nations, for gracing this occasion with his presence, and for his leadership, commitment and support to all efforts aimed at reducing the impact of natural disasters, for the welfare of humankind.

Your Excellencies, Ladies and Gentlemen,

You will recall that in 1987, the United Nations adopted Resolution 42/169 on IDNDR, and decided to designate the 1990s as the International Decade for Natural Disaster Reduction. This came about as a recognition of the very severe damages resulting from natural disasters that affect the fragile economic infrastructure of developing countries, especially the least developed, land-locked and island developing countries, and thus hampering their development process. Indeed, in

1979, hurricane David that struck Dominica had set back the Gross Domestic Product of that country by at least five years. The objective set for the Decade was therefore to reduce, through concerted international action, especially in developing countries, the loss of life, property damage, and social and economic disruption caused by natural disasters such as earthquakes, windstorms (tropical cyclones, tornadoes etc.) tsunamis, floods, landslides, volcanic eruptions, wildfires, grasshopper and locust infestations, drought and desertification and other calamities of natural origin.

The initiatives of the UN General Assembly was timely because, as we now know, all the disaster-causing events had occurred with higher frequencies and intensities during the Decade in all parts of the world.

Your Excellencies, Ladies and Gentlemen,

It has long been known that over 70 per cent of all natural disaster-causing phenomena are meteorological and hydrological in origin. For this reason, the primary responsibilities of all national Meteorological and Hydrological Services (NMHSs) are the provision of information and services for the safety of life and property of the citizens of their respective countries. As WMO works very closely with these Services, the primary objectives of its Programmes are such that the NMHSs have access to global data and information that are needed for timely warnings aimed at reducing the loss of life, property damage and social and economic disruption caused by natural disasters. It is to be recalled that such activities were in fact initiated by the predecessor of WMO, namely the International Meteorological Organization (IMO) whose establishment in 1873 was prompted by the need for weather forecasts to improve safety at sea.

Even in recent years, natural disasters associated with meteorological and hydrological phenomena are costing the world economy about US$50 billion per annum. These disasters have also caused suffering to more than two billion people since 1965 and three million lives have been lost. We only need to recall a few of the recent disasters caused by Hurricane Mitch (1998) in Nicaragua, Honduras and Guatemala; the adverse impacts of the 1997/98 El Niño in Ecuador and Peru; the flooding of the Yangtze River in China (1998) and those of River Oder in Poland, Czech Republic and Germany (1997); the tsunami affecting Papua New Guinea (1998); the forest fires in Indonesia and the associated smoke in South East Asia (1997). The list is a very long one.

Mr Secretary-General, Your Excellencies,

A key concern of the Decade is the application of science and technology to mitigate the impact of natural disasters. As a scientific and technical Organization, WMO has therefore been in the forefront of such applications especially in the mitigation of weather-, flood- and climate-related disasters.

Furthermore, WMO has been very much involved in the planning of IDNDR and has maintained an active role in the implementation of the resolutions and decisions of the United Nations General Assembly as well as the Yokohama Strategy and Plan of Action on natural disaster reduction. In particular, the WMO Congress, the highest policy-making body of the Organization, adopted in 1991 a *Plan of Action for the IDNDR*. In this connection, WMO continues to give high priority to the collection, processing and exchange of data on natural hazards of meteorological and hydrological origins for national, regional and global use, particularly for the security of

property and safety of life. The infrastructure maintained by WMO and the NMHSs for generating data and information in support of natural disaster reduction include, among others, the following:

(*a*) A global network of about 10,000 surface stations, 700 ocean buoys, 7300 ships and 1000 upper air stations, complemented by over 45000 aircraft observations per day and those from a constellation of ten geostationary and polar-orbiting meteorological satellites, weather radars and automatic weather stations, within the context of the WMO World Weather Watch (WWW) Programme;

(*b*) A global network of hydrological stations, being further enhanced through the World Hydrological Cycle Observing System (WHYCOS);

(*c*) A network of over 340 stations under the Global Atmosphere Watch (GAW) for the monitoring and prediction, among others, of transboundary air pollution including radioactivity, changes in the atmospheric concentration of greenhouse gases, and the depletion of the protective ozone layer;

(*d*) A network of World and Regional/Specialized Centres as well as national Centres of Meteorological and Hydrological Services, providing routine and emergency forecasts and warnings of hazardous meteorological and hydrological conditions such as tropical cyclones, severe storms, droughts and floods;

(*e*) A series of five Regional Tropical Cyclone bodies which coordinate forecasts and warnings on tropical cyclones

and related phenomena such as floods and storm surges in the respective areas. These bodies are of particular importance to the implementation of relevant components of the Barbados Programme of Action in support of the Small Island Developing States (SIDS);

(*f*) Specialized Centres for issuing warnings of tropical cyclones, floods, droughts, locust infestations, forest fires and other environmental hazards; and

(*g*) A network of 23 Regional Meteorological Training and Research Centres. For example, during the Decade, WMO specifically organized training courses for over 1,000 meteorologists in tropical cyclone forecasting and offered over 3,000 fellowships on subjects related to disaster mitigation.

In order to enhance the capacities of national Meteorological and Hydrological Services to provide timely warnings and advisories of weather- and climate-related natural disasters such as tropical cyclones and droughts, WMO has provided, during the Decade period, approximately US$200 million of technical assistance in support of national and regional development projects.

In addition to the long-term activities, WMO has developed and implemented the following projects, specially geared to the goals of the IDNDR:

- *Tropical Cyclone Warning System* for the South-West Indian Ocean Region – to upgrade substantially the warning system through the application of meteorological satellite and computer technology, and the transfer of scientific knowledge;

- *Comprehensive Risk Assessment* – to promote a comprehensive approach to risk assessment in order to help reduce loss of life and property caused by flooding and other natural disasters;

- *System for Technology Exchange for Natural Disasters (STEND)* – to identify and facilitate the transfer of technology for use in reducing the impact of natural disasters. In addition, WMO's Hydrological Operational Multipurpose System (HOMS) helps in technology transfer related to flood forecasting;

- The development, jointly with the International Council for Science (ICSU), *of a pilotless aircraft to improve the observation of tropical cyclones.*

Furthermore, the WMO World Weather Watch network also supports other comprehensive early warning programmes dedicated to specific hazards, such as the communication of information and warnings about volcanic ash clouds in cooperation with International Civil Aviation Organization (ICAO), dissemination of tsunami warnings in cooperation with UNESCO's Intergovernmental Oceanographic Commission (IOC), and the communication of information about nuclear accidents, in cooperation with the International Atomic Energy Agency (IAEA). WMO has also collaborated with the World Tourism Organization in the preparation and publication of a handbook on natural disaster reduction in tourist areas.

Mr Secretary-General, Your Excellencies,

The advent of increasingly powerful computers, improved observational capacity using satellite-based sensors,

telecommunications and enhanced research efforts have led to improved understanding and prediction of weather and climate systems. Such advances have enabled the *provision of skilful weather forecasts and warnings, of up to about 10 days in advance in the extra-tropical regions.* Such information has been useful in minimizing the negative consequences of natural disasters on water resource management, energy use, transportation, agricultural production and many other socio-economic activities.

In addition, intensive monitoring and data collection of the equatorial central and eastern Pacific Ocean, carried out during the Tropical Ocean and Global Atmosphere (TOGA) Project (1985–1994), resulted in a breakthrough of knowledge in El Niño prediction. These developments in El Niño prediction of a few seasons to a year ahead have been successfully used in many regions for early warning of El Niño-related extreme weather and climate events and the associated socio-economic impacts. Such *prediction capability now form crucial components of early warning and disaster preparedness activities in many regions of the world where strong El Niño signals have been detected.* In this regard, *the International Seminar on the 1997/98 El Niño event: Evaluation and Projections*, held in Ecuador in 1998, recognized the importance of such capability in support of sustainable development. It is to be recalled that the 1997/98 El Niño caused global damage of at least US$34 billion. That Seminar also agreed on the need for the establishment of an International El Niño Centre which Ecuador is prepared to host.

It is to be noted, however, that the performance of the new generation of climate models used in seasonal prediction needs further improvement in some regions of the world, such

as in the tropics, where relatively more research have to be carried out, and where the networks of surface and upper air observations are often sparse. In addition, considerable research is still required to fully understand the processes involved in the space-time evolution of most of the systems which result in natural disasters, especially those which are local or sub-regional in nature such as hailstorms, lightnings, thunderstorms and tornadoes.

A scientific challenge for the next century is to further explore and enhance those advances in science and technology relevant to the mitigation of natural disasters. To date, the prediction of weather-related disasters with good lead-time and adequate preparedness is still the best disaster mitigation option. Indeed, studies of the economies of disasters showed that for every dollar spent on prevention and preparedness, between US$100 and 1000 are required for an equivalent effect after a disaster. In addition, it is not possible to attach a monetary value on the life of a human being.

In its efforts to continually improve the capability of skilful prediction of weather and climate including natural disaster-causing events, WMO in collaboration with the IOC of UNESCO and ICSU has been implementing a *Climate Variability and Predictability (CLIVAR) project under the World Climate Research Programme.* The project is building upon the achievements of TOGA. Also, WMO Congress has recently instituted a new research project entitled *World Weather Research Programme* mainly to better understand the intensive weather phenomena that are responsible for disasters.

Mr Secretary-General, Your Excellencies,

Intensive weather and climate phenomena that result in natural disasters constitute a normal component of the global climate

system. They had occurred in the past and will continue to occur in the future. What will be required is to further understand their nature. For instance, it has been noted that since the early 1970s, El Niño phenomena have been more frequent than La Niña. Associating some of these observed extremes to global warming is still a question of scientific debate, due to limitations of data, and the scientific knowledge for the detection and attribution of observed climate variability and climate change signals.

The Second Assessment Report of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) issued in 1995 contained an assessment of the impact of climate change on phenomena that can result in natural disasters. While more research is required, it is expected that a warmer climate will result in a more intense hydrological cycle leading to increased drought conditions in some areas and floods in others. The Third IPCC Assessment Report which is expected to be issued in the year 2001 will provide further insights into the subject.

Mr Secretary-General, Your Excellencies, Ladies and Gentlemen,

This Forum is expected to propose a cost-effective strategy as well as guidelines and a programme of action for a coordinated and comprehensive approach to the reduction of the impact of natural disasters, as a contribution to sustainable development in the 21st century. In undertaking these tasks the Forum should take the following into account:

Firstly, *the need to critically assess the current state of the science and technology used in natural disaster reduction and*

prevention, identifying improvements made during the Decade and, most importantly, making suggestions for future operational and research programmes to ensure continued progress. Some of the areas of focus should include the enhancement of current scientific ability to forecast geophysical events that cause natural disasters, and the strengthening of scientific and technological infrastructure, including observational networks, to support nations in natural disaster mitigation. Particular emphasis should be placed on existing national, regional and international capacities to determine vulnerability, undertake preparedness actions, provide warnings and promote awareness through public education programmes.

Secondly, the Forum might wish to propose how best the *regional centres, especially those in developing countries, which monitor and provide early warnings should be further supported.* As many of the disasters have regional and global dimensions, the resources required are sometimes beyond the capacity of many countries. A good example of the global dimension of natural disasters is the worldwide occurrence of extreme weather, hydrological and climate events, causing disasters which are observed during El Niño/La Niña episodes. In this connection, an El Niño International Centre could be established, to be hosted by Ecuador as earlier indicated.

Thirdly, as the major early warning tools in the 20th century were products of research including the current ability to provide skilful prediction of El Niño, the Forum *should propose how best to enhance support for continued research at national, regional and global levels.* WMO will continue to provide the international coordination of relevant research through its Atmospheric Research and Environment and its World Climate Programmes to enable the scientific community and all Member countries to maximize the benefits from all

research results which may be useful for early warning and disaster preparedness.

Fourthly, there is a need to identify an *intergovernmental mechanism for addressing earthquakes and volcanic eruptions* so that the occurrence of these phenomena are better addressed.

Mr Secretary-General, Your Excellencies,

The implementation of the action plans for the Decade has resulted in significant awareness for enhanced collaboration between the scientific and technical agencies and the humanitarian and development agencies, particularly within the United Nations System. In our view, the humanitarian and development components have to be coordinated by the Office for the Coordinator of Humanitarian Affairs (OCHA), and the United Nations Development Programme (UNDP), while the *scientific and technical aspects is to be coordinated by an Inter-Agency Secretariat supported by all relevant UN Specialized Agencies and Programmes.* Such an arrangement will ensure the enhancement of the scientific and technical programmes in support of the mitigation of natural disasters.

As we move into the next millennium, there will be increasing concern on how to more effectively address the wide-ranging effects of natural disasters. Although some progress have been made during the Decade, much more remains to be done. In some circles, it is still believed that the answer to such questions is in the enhancement of humanitarian assistance. Such belief is based on the philosophy that natural disasters are acts of God and not much can be done about them. Our view is that science and technology can make the required difference. This is the case with Bangladesh where

in 1970 about 300,000 people lost their lives when struck by a tropical cyclone. A similar intense cyclone that struck in 1994 caused a loss of less than 500 people due to enhancement of scientific and technological support in mitigation efforts.

I hope therefore that this Forum will look back on the significant difference made by science and technology, over the Decade period, and formulate with conviction, appropriate strategies to address the related concerns of humanity in the 21st century.

Thank you.