CLIMATE INFORMATION FOR DISASTER RISK REDUCTION

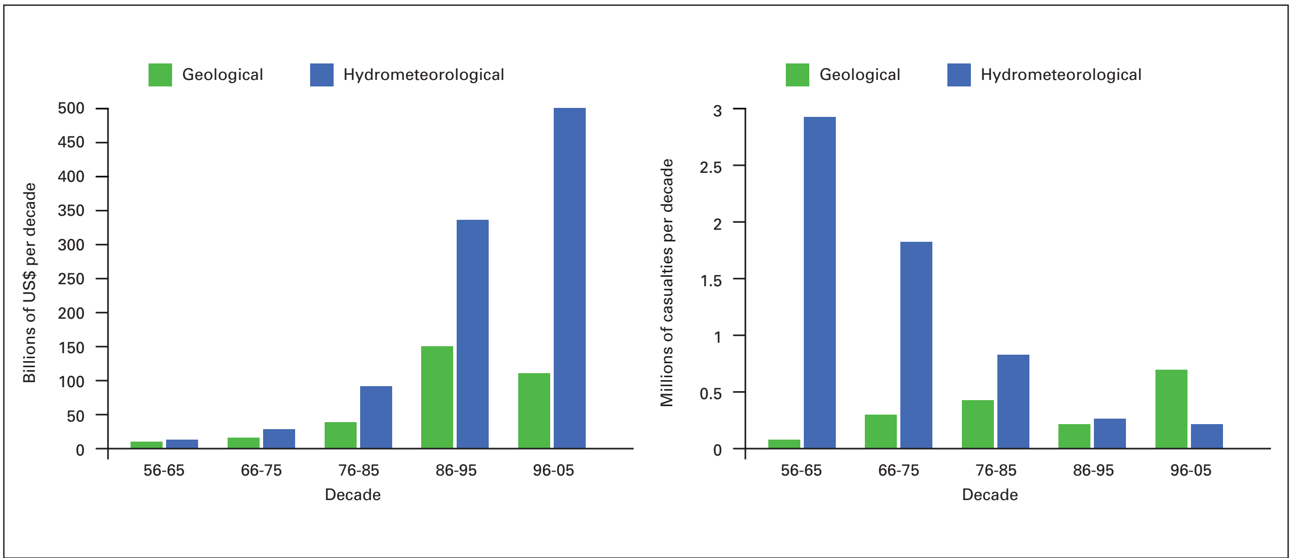
World Meteorological Organization
Weather • Climate • Water

UN SYSTEM DELIVERING AS ONE ON CLIMATE KNOWLEDGE

Every year natural hazards cause significant loss of life, and erode or destroy development gains. From the ten most commonly reported disasters, nine are directly or indirectly related to weather or climate. Vulnerability to disasters is increasing as more people and assets locate in areas of high risk. Since 1970, the world's population has grown by 87 per cent. During the same time, the proportion of people living in flood-prone river basins increased by 114 per cent and on cyclone-exposed coastlines by 192 per cent. Rapid urbanization and the growth of megacities will increase exposure to natural hazards. Climate change is expected to increase the frequency and intensity of the most severe weather related hazards in the decades to come.

Over the past five decades, economic losses related to hydro-meteorological hazards have increased, but the human toll has fallen dramatically. This is thanks to scientific advances in forecasting, combined with proactive disaster risk reduction policies and tools, including contingency planning and early warning systems in a number of high risk countries. In 2005, governments endorsed the Hyogo Framework for Action 2005 – 2015 to build the resilience of nations and communities to disasters. The paradigm shift from post disaster response to a proactive risk reduction approach requires meteorological, hydrological and climate services to support science-based risk management decisions, as well as investments in early warning systems.

Increasing number of countries are taking steps at national to local levels to reduce risks associated with natural hazards. Among issues hampering these efforts is a lack of data concerning a country's past climate to quantify hazard characteristics (e.g., frequency, severity and location) of local climatic extremes in the future.



GOLNARAGHI M., J. DOURIS, J.B. MIGRAINE (2009) "SAVING LIVES THROUGH EARLY WARNING SYSTEMS AND EMERGENCY PREPAREDNESS," *RISK WISE*, TUDOR ROSE, PAGES 137–141

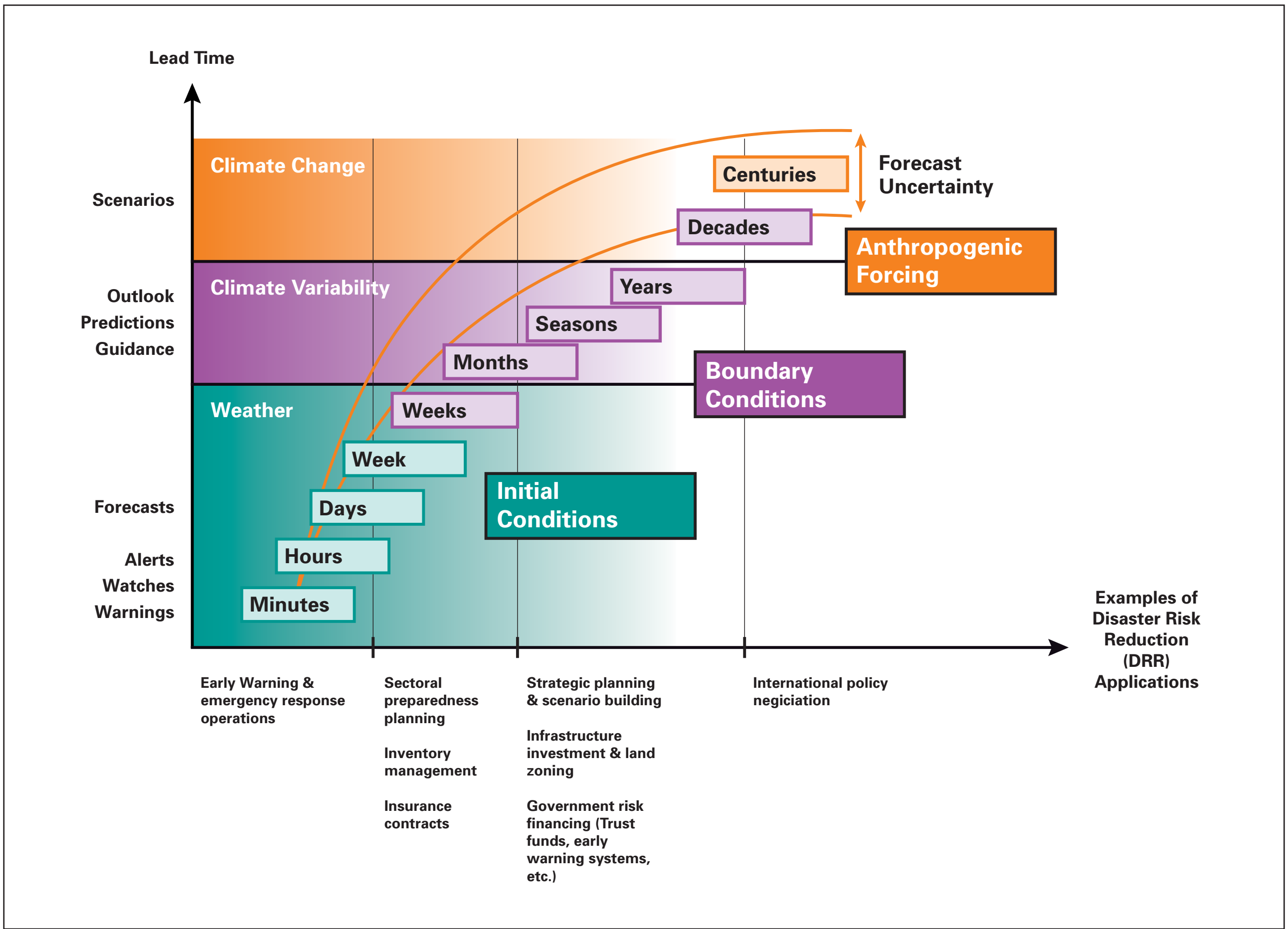
Trends in economic loss and loss of life in the past decades due to natural hazards.

Disaster risk reduction is therefore one of the high priorities for the development of the Global Framework for Climate Services, to meet both the growing needs and opportunities to increase disaster resilience. With appropriate use of meteorological, hydrological and climate information as part of a comprehensive multi-sector, multi-hazard, and multi-level (local to global) approach, considerable achievements can be realized.

An essential starting point for reducing risks is a quantitative assessment which combines information about the hazards with exposures and vulnerabilities of the population or assets (e.g., agricultural production, infrastructure and homes, etc). The hazard side of the equation uses historical data and forward looking modeling and forecasting about environmental conditions e.g., tropical cyclones, rainfall, soil moisture and hill slope stability, mountain weather patterns and river basin hydrology. This must be augmented with socio-economic data that quantifies exposure and vulnerability (for instance, casualties, construction damages, crop yield reduction and water shortages).

Equipped with the quantitative risk information, countries can develop risk management strategies using early warning systems to reduce casualties; medium and long-term sectoral planning (such as land zoning, infrastructure development, water resource management, agricultural planning) to reduce economic losses and build livelihood resilience; and weather-indexed insurance and risk financing mechanisms to transfer the financial impact of disasters.

The emergence of climate prediction provides opportunities to increase the lead times of early warnings. For instance, seasonal climate outlooks help governments predict – and manage – excessive or deficient rainfall. Historical data has traditionally been used for analysis of hazards patterns. But this is no longer sufficient, because hazard characteristics are changing as a result of climate change. For instance a 100-year flood or drought may become a 30-year flood or drought or, simply said, more severe events could happen more frequently in the future. Weather and climate services with forecasts from the next hour to seasonal through to decadal time scales are therefore needed to inform long-term investments and strategic planning on, for instance, coastal zone management, development of new building codes and the retrofitting of infrastructure to withstand more frequent and severe hazards.



Seamless hydrometeorological and climate services for various risk management applications.

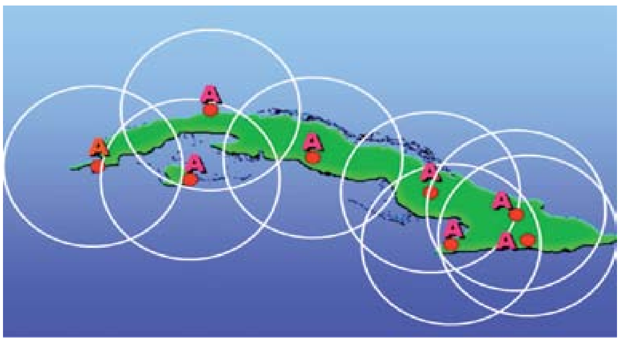
Investment in meteorological services and early warning systems have been demonstrated to help with reducing loss of life associated with meteorological hazards. Meeting today's climate-related risks is a pre-condition to being able to adapt to future climate-related challenges including more intense precipitation and storm surges, droughts, heat waves as highlighted by the Intergovernmental Panel on Climate Change.

Shanghai is the most populous city in the People's Republic of China and one of the largest in the world, with an estimated 23 million inhabitants. Due to its location at the mouth of the Yangtze River and on the Pacific coast, it is affected by many meteorological and hydrological hazards such as typhoons, storm surges, severe rains, lightning, fog, cold and heat waves, as well as atmospheric pollution.

Shanghai's Multi Hazard Early Warning System (MHEWS) is a successful example of close multi-agency coordination and cooperation, demonstrating the potential challenges and opportunities for other megacities. It is overseen by the Shanghai Emergency Management Response Committee, consisting of more than 50 members of government agencies concerned with management of impacts of natural hazards, fire, traffic accidents, chemical or nuclear accidents, public health, earthquakes and the provision of climate information and weather-related warnings which are integrated into the MHEWS platform.

Cuba is in the path of most tropical cyclones that develop in the Atlantic basin and Caribbean Sea. During the past 158 years, Cuba has been affected by 205 cyclones or roughly 1.3 cyclones each year. In order to protect the lives of its citizens, the government has made considerable investments in its early warning system. The system hinges on effective meteorological and hydrological observing and communications networks, including a radar network which provides coverage for the entire country. This is combined with an appropriate legal basis, inter-institutional collaboration, contingency planning at all levels, use of all mass media for communicating information and warnings, and public education. As a result, Cuba has successfully reduced casualties from hurricanes combining meteorological information with an effective emergency preparedness and response operations that link the national government to local communities.

For instance, in the space of 20 days in 2008, Cuba was impacted by three hurricanes, including Gustav and Ike which were both major category 4 storms. Material losses topped US$ 9 billion. Nevertheless, there were only 7 fatalities thanks to the high level of preparedness and the evacuation of hundreds of thousands of people.



INSTITUTE OF METEOROLOGY, CUBA

Cuba's meteorological radar coverage.

Financial Disaster Risk Transfer and Weather-indexed Insurance

Scientifically based climate services are a pre-requisite of disaster risk financing and financial risk transfer (weather indexed insurance, etc.) mechanisms which are being piloted in a number of countries. For instance, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) has been established as a regional insurance pool to help governments in the hurricane-prone Caribbean region with short-term liquidity problems in the aftermath of disasters, in particular to enable the early recovery phase.

In Ethiopia, the World Food Programme in cooperation with the Ethiopia National Meteorological Agency pioneered a drought insurance pilot project to disburse funding if a weather index reported a significant drop in rainfall against historical averages. This was to respond to the government's concern to escape the cycle of disaster response and embrace more comprehensive risk management. In Malawi, the World Bank in cooperation with Malawi Meteorological Services initiated a pilot weather insurance programme in 2005/6 to deal with the risks of widespread or localized drought or flooding. The goal of the programme was to use weather-indexed insurance as a means to manage the weather-related risks by providing credit to farmers. The policy relied on the rainfall index calibrated with the rainfall needs of the crop being insured. If too little or too much rain was received, this would trigger a payout to the insured farmers.

Both schemes depended on long climate record of at least 30 years of daily meteorological data, reliable and regular daily collection and reporting procedures of meteorological data; daily quality control of the data; to allow for a proper analysis of climate extremes and their impact, development of weather indices for contract design and settlement of the contracts.

Expansion of such schemes will depend on investment in basic equipment such as observing and telecommunication networks, institutional and human capacity development for National Meteorological Services in developing countries to allow them to provide essential climate services for the protection of lives and livelihoods of their peoples.

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