Understanding disaster risk: hazard related risk issues

SECTION III
Meteorological, climatological and biological risk

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Section III. Meteorological, climatological and biological risk

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Introduction

The following subchapters cover meteorological, climatological and biological risks. In terms of meteorological risks, hazards from different types of storm systems as well as extremes of temperature are covered. Climatological risks include droughts and wildfires, and the biological risks posed by epidemics and pandemics are also examined. Each of these hazards is described in turn:

- There are two types of storm in meteorology: (1) the hazardous weather phenomena themselves (e.g. windstorms, rainstorms, snowstorms, thunderstorms and ice storms) and (2) the meteorological features in the atmosphere or storm systems that are responsible for the adverse weather. The latter includes tropical cyclones, extra-tropical cyclones and convective systems.

- Temperature extremes are rare high- or low-temperature events that may occur over a range of time and geographical scales. They usually occur because of a change in the weather pattern over a few days or several weeks.

- In terms of climatological risks, droughts result either from a shortfall in precipitation over an extended period of time, from its inadequate timing in relation to the needs of the vegetation cover, or from a negative water balance due to increased potential evapotranspiration caused by high temperatures.

- Wildfires refer to fires affecting grasslands, shrublands and other non-forest land covers. Although they are mainly initiated by human actions, their intensity and the effects they cause are mainly driven by fuel condition and availability, vegetation structure and prevalent meteorological and topographic conditions, and thus they are termed a natural hazard.

- An epidemic is the widespread, and often rapidly extending, occurrence of an infectious disease in a community or population at a particular time. A pandemic is the extension of an epidemic to many populations worldwide or over a very wide area, crossing many international boundaries and affecting a large number of people.

All of these hazards can lead to a range of substantive direct and indirect impacts on human activity and infrastructure. Compared with other meteorological disasters, extreme temperatures (particularly high rather than low temperatures) can cause the most severe consequences in terms of human lives lost. Droughts can affect extended areas and large populations, putting socio-economic systems and the environment at risk. Wildfires emit large volumes of smoke and gases that can aggravate respiratory problems, resulting in the

deaths of susceptible individuals. Demographic, physical, socioeconomic, behavioural and institutional factors may moderate a population's vulnerability to most hazards, particularly temperature extremes and epidemics. Thunderstorm asthma is a term used to describe an observed increase in acute bronchospasm cases following severe thunderstorms, which can have significant impacts on individuals' health and on health services.

Of particular concern is the evidence that human-related climate change is increasing the frequency of these hazards. The accelerated growth in global mean temperature since 1975 and the projected increase over the next several decades have implications for the occurrence of temperature extremes. A number of researchers have also highlighted the potential changes in fire climate regimes in different parts of the world, which may result in increased fire risk and an exacerbation of the effects of wildfires.

However, these hazards do not always occur in isolation and can often interact with or influence one another. This is explained in chapter 2.5 where evolution of risk can be even so complicated that one hazard changes the vulnerability conditions for the next. For example, epidemics of Rift Valley fever often commence when a period of drought is followed by flooding or intense rainfall, so climate perturbations may herald an increased risk of outbreaks in at-risk regions. Similarly, prolonged droughts and heat waves dry out fuels, creating conditions which can exacerbate uncontrollable wildfires.

The following subchapters describe the current knowledge regarding the risk assessment and management of each hazard in detail, identifying a set of recommendations for key stakeholders to reduce and manage their risks.