Understanding disaster risk: hazard related risk issues

SECTION II
Hydrological risk

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Introduction

The following subchapters cover the principal hydrological risks and, in the case of landslides, hazards that are triggered through hydrological events. In the case of floods, the subchapters cover fluvial, flash and pluvial floods, as well as coastal flooding caused by wave actions and storm surges:

- Fluvial floods occur when river levels rise and burst or overflow their banks, inundating the surrounding land forming the river's floodplain. This can occur in response to storms with higher than normal rainfall totals and/or intensities, to seasonal strong weather systems such as monsoons or winter stormtracks, or to sudden melting of snow in spring.

- Flash floods can develop when heavy rainfall occurs suddenly, particularly in mountainous river catchments, although they can occur anywhere. Strong localised rainfall, rapid flood formation and high water velocities can be particularly threatening to the population at risk and are highly destructive.

- Heavy rainfall may cause surface water flooding, also known as pluvial flooding, particularly in cities where the urban drainage systems become overwhelmed.

- Floods can also be generated by infrastructure failure (e.g. dam breaks), glacial/lake outbursts and groundwater rising under prolonged very wet conditions, which cause waterlogging. In many cases, flooding occurs as a result of more than one of the generating mechanisms occurring concurrently, making the prediction of flood hazards and impacts even more challenging, and the probable resulting damage more severe.

- Coastal flooding is caused by a combination of high tide, storm surge and wave conditions. Development on flood plains increases the risk as does coastal erosion and sea level rise.

- Landslide occurrence is related to causal factors, which create a propensity for a slope to fail and trigger the specific external event that induces landslide occurrence at that particular time. In most cases, but not all, the timing of failure is associated with a trigger event.

- Heavy rainfall is a key factor in generating landslides, primarily through the generation of pore water pressures and a reduction in the effective normal stress. The second key factor for landslide generation is the impact of seismic events.

Floods and landslides affect a large number of people across the world every year, with severe socioeconomic impacts. Severe fluvial flooding repeatedly afflicts European populations, with trans-national events often being the most

damaging. It is estimated that GBP 150 billion (EUR 177 billion) of assets and 4 million people are currently at risk from coastal flooding in the United Kingdom alone, for example. Significant advances have been made in recent years to map these risks, to develop and set up EWSs for better preparedness and to improve the communication of risks to decision-makers and the public. However, variations in socioeconomic factors (land use, demography, migration) as well as changes in climate and weather patterns may lead to rapid changes in flood and landslide risk in the future and will require increased levels of adaptation.

This chapter describes the current knowledge regarding the drivers, impacts and key tools to manage risks for these hazards. It identifies a set of challenges and gaps for key stakeholders to further reduce and better manage their risks and to be prepared for future changes in risk.