Natural and man-made hazards

Natural and man-made hazards include, for instance, droughts, desertification, floods, fires, earthquakes and dispersion of radioactive gases in the atmosphere. They have significant social, environmental and economic impacts. The JRC carries out extensive work to continuously monitor the situation, assess risks and potential impacts, and forecast future events as accurately as possible in order to help prevent these phenomena from happening or to limit their impact.

The JRC carries out research to support EU policies related to climate change, sustainable management of natural resources, water, food security, disaster risk reduction, and response and actions to prevent and fight forest fires.

The JRC provides the knowledge base that helps EU countries and international partners prepare for and respond to natural and man-made disasters. An important part of this work is the development of methods and tools to monitor the situation, assess risks and predict future developments. The JRC also carries out research on the seismic vulnerability of buildings, which is used to develop European standards for the construction sector, for example. It has also developed a web-based platform that provides instant alerts of disasters, as well as methods of automatically analysing satellite images in order to assess damages.

Desertification and drought

Drought and desertification, two closely related natural events, can have significant impacts on the environment, society and the economy. They also affect vegetation cover and the entire water cycle, which have to be closely monitored. The JRC helps address this need by evaluating regional and global land degradation, drought and desertification through a range of activities.

Euronews Futuris series: Drought alert in Africa


Video of Drought alert in Africa - futuris
Floods

In order to mitigate serious impacts of flooding, it is necessary to forecast flood risk and establish effective support networks that can be activated during a flood crisis. The JRC’s activities cover many aspects of flood research, including regional climate information, coordination of flood detection, and development of models capable of simulating hydrological processes.

Fires

Over 60 000 forest fires take place every year in the EU, burning, on average, half a million ha (nearly twice the area of Luxembourg), and causing human casualties and economic losses estimated at around €2 billion. It is believed that the damage caused by forest fires is likely to increase in the future. The JRC supports the ongoing effort to help minimise this damage by carefully monitoring European forests, continually assessing the risk of fires, providing early alerts for fire prevention and fighting, and evaluating how forest fires may be impacted by factors such as changes in climate and land cover in the future.

Earthquakes and tsunamis

The JRC helps to mitigate the effects of earthquakes and tsunamis by assessing the structural behaviour of buildings under earthquake conditions and estimating tsunami wave height and travel times through a modelling system.

Early warning

Early warning systems are essential components of informed decision-making that provide the relevant authorities and the emergency response community with sufficient lead time to take
effective preparatory measures and to quickly decide and coordinate the course of action during the response phase. The JRC has developed a range of tools and systems that can help to improve preparedness and response to natural and man-made disasters.

More information:
Crisis management [5]

**Atmospheric dispersion**

The JRC models, analyses and predicts the movement of air pollutants and toxins emitted from various sources, including transport and industry. The models account for a wide range of possible transformations of pollutants such as the effects of meteorology, radioactive decay and interaction with ecosystems.

More information:
Atmospheric dispersion [6]

**Preventing industrial accidents**

The JRC addresses the disaster risk of hazardous industrial installations and helps protect the citizen from relevant threats, both accidental and deliberate. The JRC also studies the structural behaviour of buildings and other infrastructures under earthquake and explosion scenarios and develops methodologies to increase the safety of buildings. In addition, space technologies are used at the JRC for disaster preparedness and prevention.

More information:
Preventing industrial accidents [7]

**Technological accidents triggered by natural disasters**

The JRC supports EU Member States in identifying and reducing the risks of technological accidents triggered by natural disasters, also known as Natechs. These accidents are expected to increase as a result of climate change. Research is carried out at the JRC to better understand the underlying impacts of natural hazards on industrial facilities. The JRC developed a mapping tool, RAPID-N, that allows for the identification of areas prone to Natech in order to support authorities in analysing and evaluating such risk.

More information:
Technological accidents triggered by natural disasters [8]

**Disaster risk management**

Natural and man-made hazards continuously threaten population in Europe and beyond. The JRC carries out extensive work to improve the scientific evidence base for risk assessment in Europe and worldwide, not only in hazard characterization, but also in vulnerability and exposure assessment (essential components for risk assessment) and development of guidelines and standards for risk data (including disaster loss data).

More information:
Disaster risk management [9]