

# Understanding Hazards, Assessing Risks, Strengthening Resilience

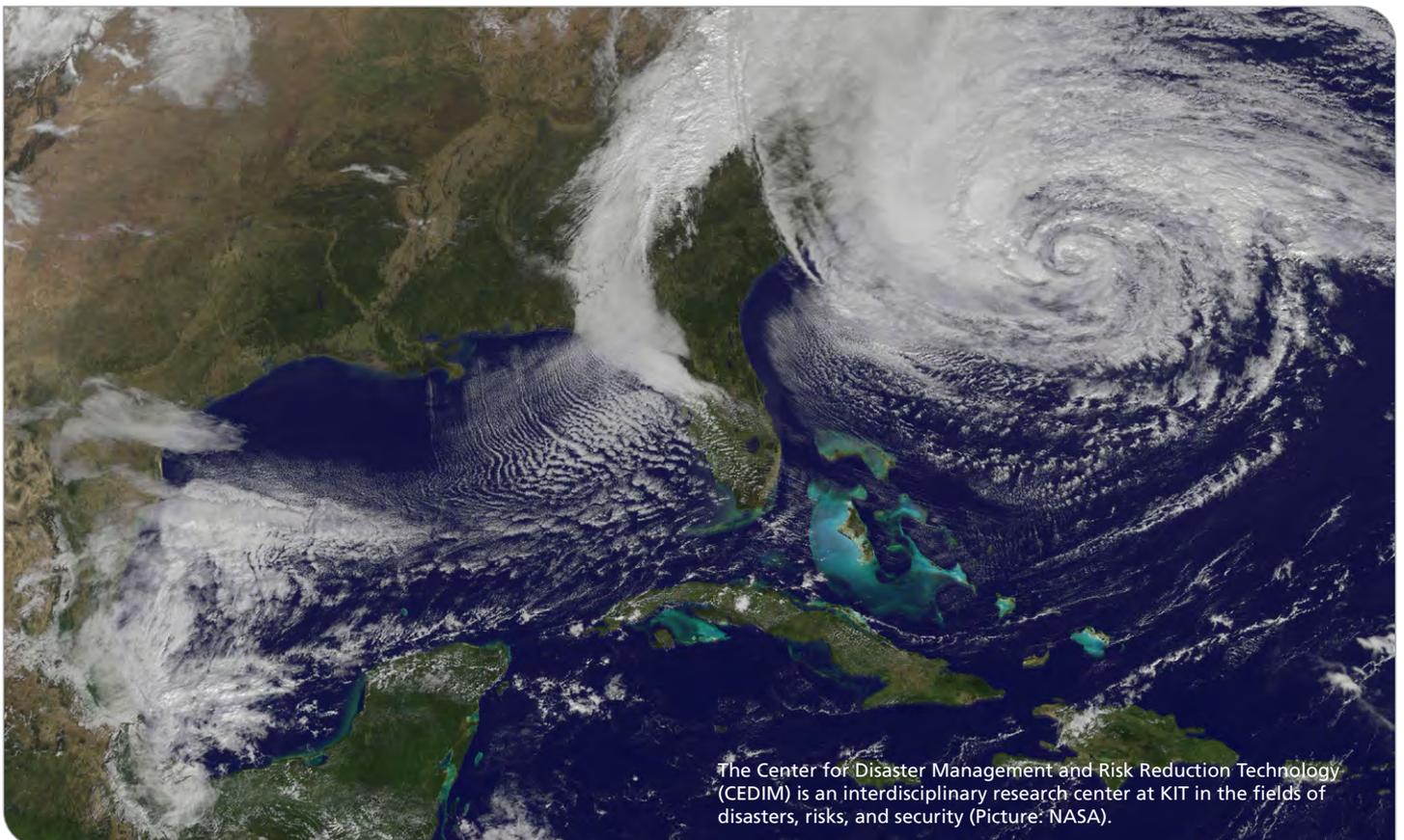
## Hazard Assessments and Risk Analyses of Natural Disasters

Storms, floods, earthquakes, and other extreme events frequently cause huge losses and numerous deaths. The frequency and impact of such events will increase significantly due to the global change - especially due to climate change, population growth, urbanization, and the dependence on critical infrastructure. Since 20 years, the **Center for Disaster Management and Risk Reduction Technology (CEDIM)**, a cross-disciplinary research center at KIT, has been conducting research on causes, management and prevention of such natural and technical risks. CEDIM develops new models and concepts to enhance security and resilience of society and economy. This interdisciplinary approach allows to consider the entire process chain of natural disasters – not only causes, hazard, and risk but also the impact on society and environment. To strengthen resilience, research is being conducted on smart technologies for preventive planning and agile management of infrastructures.

### Research for the Benefit of Society, Policymakers, and industry

CEDIM's successful research activities include:

- **Hazard and risk assessments** for storms, earthquakes, and floods; accessible interactively via the **CEDIM Risk Explorer Germany** ([https://www.risklayer-explorer.com/cedim\\_explorer](https://www.risklayer-explorer.com/cedim_explorer), e.g. relevant to site analysis for sustainable construction by the Federal Ministry for Digital and Transport, BMDV).
- **Crisis manual for power blackouts in Baden-Württemberg** for municipal disaster management institutions (municipalities, fire departments).
- **Development of novel risk models** for hail, floods, and earthquakes with an operational application on the insurance market.
- **Corona Dashboard** in cooperation with Risklayer GmbH (spinoff of KIT); used by various media, academic institutions, and politics.



The Center for Disaster Management and Risk Reduction Technology (CEDIM) is an interdisciplinary research center at KIT in the fields of disasters, risks, and security (Picture: NASA).

## Impacts of Heat and Drought

The current research focus of CEDIM is on the **impacts of heat waves and droughts in Central Europe on society, economy, and ecology**. Heat waves are usually accompanied by exceptional drought. As a result of climate change, they significantly increased in frequency, intensity, and duration in many countries in the past decades. For the future, all climate models predict further aggravation of the situation. Researchers in CEDIM are addressing the extent to which dams can be used for both flood protection as well as heat and drought protection – in particular for the purpose of drinking water supply and energy production. They are also investigating the impact of droughts on German waterways and assessing possible current and future limitations on shipping – and thus on supply chains. Another topic is the impact of drought and heat waves on forests in Central Europe. These studies are based on high-resolution remote sensing data.



The CEDIM/Risklayer Explorer in cooperation with Risklayer GmbH provides various information on past or current natural disasters (<https://www.risklayer-explorer.com>).

## Rapid Analyses in Disaster Cases

**Near real-time forensic disaster analysis (FDA)** is another focus of CEDIM. Immediately after a disaster, the CEDIM Task Force investigates the temporal and spatial evolution, estimates its direct impacts (damage, fatalities, refugees), identifies the most important drivers of the disaster, and derives conclusions for prevention measures. Within a few days, CEDIM publishes first reports – as in July 2021 on the severe flood event in Central Europe. Research institutions and the media, among others, use these reports. The World Bank, for example, uses the results of the rapid loss assessment based on model data, remote sensing data, and socio-economic parameters as well as historical events in the region to determine the financial volume of disaster relief in specific disaster scenarios. This is especially relevant in the case of severe disasters in developing countries in order to be able to quickly provide relief funds from the international community.

## CEDIM Risklayer Explorer

Developed together with the CEDIM/KIT spinoff Risklayer GmbH, the **CEDIM/Risklayer Explorer** (<https://www.risklayer-explorer.com>) summarizes real-time analyses of recent disasters. Researchers, actors in disaster management, decision-makers, and the interested public can obtain detailed information in the form of easy-to-read metrics, detailed reports, and graphics. Since the beginning of the COVID-19 pandemic, infection case numbers and many other data sets have also been made available through interactive maps for both Germany and globally. These data were collected by many volunteers (crowdsourcing), quality-controlled, transferred to the platform, and used by media, politics, and other COVID-19 dashboards (e.g. Johns Hopkins University). Collected on a daily or subdaily basis, the data were much more accurate and up-to-date than the official statistics in Germany.

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