



PILOT REGIONS

To understand, describe and quantify multi-risk situations **RIESGOS** works with stories (specific case studies) in selected pilot regions in Chile, Ecuador and Peru.



These stories represent realistic multi-risk situations with cascading effects. For each story, a storyboard has been developed, which provides a general description of a situation, defines specific hazards, and the related vulnerabilities and consequences of the impact of some event or events. The resulting stories will

provide a learning environment and will guide the **RIESGOS** team in the development of web components and services, which will form the basis for the demonstrator.

EXPECTED IMPACT

The **RIESGOS** project aims to:

- ◇ Strengthening research into multi-hazard scenarios and multi-risk assessment.
- ◇ To bring scientific research closer to practical applications within the framework of risk management by providing novel approaches to multi-risk assessment.
- ◇ Integrate the perspective of local users into the development of the resulting system and the research programme.
- ◇ Foster the development of modular information systems components to serve a wide range of applications.
- ◇ Increase scientific exchange between countries.
- ◇ Identify the application potential of the results for economic utilization.

More information about the project:
www.riesgos.de

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MULTI-RISK ANALYSIS AND INFORMATION SYSTEM COMPONENTS FOR THE ANDES REGION

From single-hazard to multi-hazard risk assessment, including exposure and dynamic vulnerability, and progressing towards the analysis of cascading effects



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THE CHALLENGE

In recent decades, the risk to society due to natural hazards has increased globally. To counteract this trend, effective risk management is necessary, for which reliable information is essential. Most existing natural hazard and risk information systems address only single components of a complex risk assessment chain, such as, for instance, focusing on specific hazards or simple loss measures. Complex interactions, such as cascading effects, are typically not considered, as well as many of the underlying sources of uncertainty. This can lead to inadequate or even miss-leading risk management strategies, thus hindering efficient prevention and mitigation measures, and ultimately undermining the resilience of societies.



OBJECTIVES

The main objectives of **RIESGOS (Multi-risk analysis and information system components for the Andes region)** call upon innovative research on multi-risk analysis and related cascading effects in selected areas in three Andean countries: **Chile, Ecuador** and **Peru**.

The scientific findings and results will be shared with cooperation partners in the specific South American countries through the development of web services and the elaboration of a **demonstrator of a modular and flexible multi-risk information system**.

The results and developments will allow disaster management and civil protection authorities to explore complex multi-risk scenarios with the ultimate goal of reducing risks and enhancing disaster management.

The **RIESGOS** consortium consists of the following scientific research institutions and SMEs:

- ◇ German Aerospace Center
- ◇ German Research Center for Geosciences
- ◇ Alfred-Wegener-Institute
- ◇ Technical University of Munich
- ◇ 52°North
- ◇ geomer GmbH
- ◇ EOMAP GmbH & Co. KG
- ◇ plan + risk consult
- ◇ DIALOGIK gGmbH

The following associated partners are supporting the project: GIZ, UNOOSA/UN-SPIDER, UNESCO, and MunichRE. **RIESGOS** is collaborating with a large number of research partners and public authorities in the South American partner countries, and plans to foster this cooperation during the course of the project.

The project has a duration of three years (11/2017 – 10/2020).

METHODOLOGY

RIESGOS is comprised of five **working fields**: (1) natural hazards and scenario development, (2) multi-risk assessment, (3) design and implementation of multi-risk information system components, (4) the integration of users' perspective in the development process of the systems components while considering its use in spatial planning and risk communication, and (5) market potential analysis for economic utilization.

RIESGOS integrates approaches from different disciplines, such as geophysics, hydrology, geology, geography, geo-statistics, and remote sensing, considering the existing initiatives and services of the South American partners. Scenarios will be developed for five different hazard types: **earthquakes, landslides, volcanoes, floods, and tsu-**

namis, and their possible interactions. Research on exposed elements with respect to multiple natural hazards includes the analysis of Earth observation data, as well as innovative techniques for in-situ data collection and methodologies for developing **integrated exposure models**.

The **assessment of dynamic vulnerability** in relation to natural hazards, including structural, social, and systemic aspects, will lead to models with space-time dependent components. Cascading effects, which can significantly increase the risk, will be identified and modelled in a probabilistic manner.

The development of a **multi-risk information system demonstrator** is one of the main objectives of the project. In coordination and close cooperation with our South American partners, a modular and scalable system concept will be designed and developed.

Central elements of the RIESGOS information system concept are the **web-based services** offering open and flexible access to decentralized data and computation services. The system demonstrator will combine and orchestrate

these web services, allowing users to **explore multi-risk scenarios**. An added value is the modular and interoperable approach, which will allow the integration of the web services into existing system environments.

TOWARDS A PRACTICAL APPLICATION

The **RIESGOS** approach is guided by the **needs of the potential users and its practical applicability**. This is ensured by a thorough analysis of the user requirements and a feedback mechanism during the development process.

The development of the demonstrator is complemented by various initiatives of the German consortium and the South American partners to assess and test the applicability for the **risk communication** with actors from science, politics, administration, economy, and civil society, as well as for **land-use planning** and risk management.

In addition, the potential for the possible economic use of the developed approaches within **RIESGOS** will be analysed during the project.

