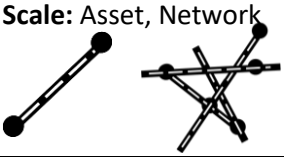
Austrian risk-based approach to natural hazards

Context

Climate Region: Central and Eastern Europe, Mountainous Regions	**Location:** Austria	**Key Actors:** Infrastructure Owners, Consultants, Contractors, Environmental Authorities
Processes Covered: Risk assessment, Risk Evaluation, Adaptation Solutions	**Scale:** Asset, Network 	**Infrastructure Type:** Road 

Outline

ASFINAG provides nearly 2400 km of highway roads all over Austria, including within mountainous regions where gravitational hazards occur on a high frequency. An accurate hazard management system is required, which can help manage the risky areas and protect ASFINAG's customers, employees and assets.

The handling of natural hazards in ASFINAG's area of responsibility is based on a risk-based approach, embedded in a risk management process based on ISO 31000 and the ÖNORM D 4900 series. The risk-based approach to natural hazard management is based on a systematic method that is uniform and comprehensible throughout the company.

An integrated approach to natural hazards encompasses all phases of the risk cycle: the prevention, coping and regeneration.

Analysis of climate hazards

Natural hazard-induced risks in the existing A+S motorway network are recorded and analysed. The risk analysis is based on systematic and scientifically supported procedures. Both the intensity and frequency of natural hazards and the expected damage are recorded, assessed and minimised.

Climate Hazards Considered:
Flooding
Landslides

In the risk assessment, a decision is made on which risks are considered as acceptable or unacceptable. Acceptable is a risk that is judged to be acceptable by a defined criterion, monitored and communicated.

Only gravitational natural hazards are considered in the strategy. Climate change is not explicitly dealt with in the strategy as it focuses primarily on the 'reaction' to natural hazards with current assessment parameters.

Changes in the design parameters, including those caused by climate change, can only be adapted in the standards. As several studies are currently underway, this will happen in the near future, although ASFINAG only has limited influence on this topic.

The gravitational natural hazards are examined and evaluated in detail by external experts, resulting in measures (e.g. construction of new protective structures or adaptation of existing protective structures). In the course of the risk analysis, climate change-related changes can be included in the parameters. These can for instance be changes in event variables, the loss of protective forest due to climate change, changes in the frequency of natural hazards and many more. This depends on the type of hazard, the hazard location and the assumed change in climate-induced change. The first research work on this topic has been started and the results are being implemented in the strategy on an ongoing basis.

Resilience assessment

NRAs Process
- Planning
- Operation and Maintenance
- Remediation / Rehabilitation

Resilience was not explicitly measured or assessed; it results from the measures taken. The risk analysis and assessment include a loss of functionality due to the necessary detour and the loss of tolls. This is reflected by individual parameters in the cost-benefit analyses.

The strategy and thus the entire natural hazard areas along the motorway network are evaluated at 10-year intervals. Individual danger points can be considered individually due to incidents or during inspections and monitoring.

How is increased resilience achieved?
- Prevent
- Prepare
- Respond

How are adaptation solutions considered?

Solution types considered:
- Hard measures

The integral risk management system ensures that all relevant natural hazards along the A+S network are systematically recorded, analysed and evaluated according to a uniform procedure and that a comparable level of safety is achieved. Based on this, a need for action to avoid and/or minimise the identified hazards or unacceptable risks must be developed based on a priority ranking. In addition, the acceptable risks identified based on the review criteria should be continuously monitored and periodically reassessed using suitable measures so that these risks can continue to be kept at an acceptable level.

Appraisal Methods:
- Life-cycle-costing
- Cost-effective-analysis

Measures are taken to keep future risks within acceptable limits, to reduce existing risks to an acceptable level and to regulate the handling of the remaining risks. Integral action planning is an optimization process in which risks and opportunities are considered. Proportionality must be given regarding all aspects of sustainability. In this process, it is also decided to what extent risks are avoided, mitigated and borne.

How is the adaptation strategy implemented in practice?

As all hazard points are evaluated at 10-year intervals, this allows values to be checked and adjusted. After events or in the course of maintenance or inspection, individual sub-areas can be considered separately. Natural hazards are evaluated on the entire motorway network every 10 years, and ASFINAG considers the road network also sufficiently adapted to climate change. Changing natural hazard situations based on climate change are dealt with by the relatively short evaluation interval and the associated possibility of adaptation. In addition, our protective structures are inspected at shortened intervals (depending on the type). Experts assess the functional efficiency and retention behaviour of the structures.

Lessons learned?

As the strategy is very new and ASFINAG and experience is only starting to be gained, it is too early to make any firm conclusions.