Europe Needs a Landslide Directive: A Lesson from Niscemi

Position Paper by the Board of the European Federation of Geologists (EFG)

February 2026

1. Introduction

The large-scale landslide affecting Niscemi, in the Province of Caltanissetta (Sicily, Italy), in January 2026 represents a significant geological and societal event, with implications far beyond the local context.

Recent years have seen a rise in hydro-geological hazards across Europe, including landslides, debris flows, and rockfalls, often triggered by extreme rainfall and climate change. Events such as Storm Dana in Spain in 2025, the widespread floods in Europe in 2024, and others have highlighted the severe human, economic, and infrastructural impacts of such hazards.

A 2010 study by the European Commission's European Soil Data Centre (ESDAC), based on landslide databases from 22 Member States revealed 633,696 recorded landslides, of which 485,004 are located in Italy. Other countries, including Austria, the Czech Republic, France, Norway, Poland, Slovakia, and the UK, also report more than 10,000 landslides each. However, the integration of landslide information across countries is hindered by differences in language, classification systems, and monitoring methods. Currently, landslide monitoring, risk assessment, and mitigation are largely managed at national or regional levels, resulting in heterogeneous data quality, methods, and response capacity. Cross-border coordination is limited, and best practices are not systematically shared.

A European directive would harmonise standards, ensuring consistent mapping, monitoring, and risk management across Member States.

The European Federation of Geologists (EFG) presents this analysis of the Niscemi case to underline how geoscientific knowledge must underpin territorial planning, risk governance, and climate adaptation policies across Europe.

2. Niscemi Event Summary and Key Figures

- On 16 January 2026, the first major slope movement occurred along a hillside near Niscemi, resulting in the collapse of a section of the SP43 provincial road.
- On 25 January 2026, a larger segment of the hillside failed catastrophically, extending the active landslide zone to approximately 4 kilometres in length.
- More than 1,500 residents were evacuated from high-risk zones as defined by civil protection authorities.
- A safety perimeter of at least 150 metres from the active landslide front was declared.
- Italian authorities declared a state of emergency for the affected municipal areas on 27 January 2026.
- As of early February 2026, no casualties had been reported, but monitoring was intensified and temporary relocation extended for part of the evacuated population.

3. Geological Context and Mechanisms

The geological foundation of the Niscemi area consists of:

- Stratified sedimentary deposits: surface sands and silts overlying thick, low-permeability clayey layers.
- This configuration is prone to deep translational and rotational slide mechanisms when saturated.

Heavy rainfall associated with the Mediterranean depression storm called "Harry" caused prolonged soil saturation, increasing pore-water pressure and reducing shear strength of the clay layers which is a condition favourable for slope failure. This reflects established principles in landslide mechanics. (Iverson, R.M. (2000) - “Landslide triggering by rain infiltration.” - *Water Resources Research*, 36(7), 1897–1910).

4. Historical Risk and Prior Evidence

The Niscemi area has a documented history of instability:

- A major landslide occurred on 12 October 1997, in the *Sante Croci* district, leading to the evacuation of about 400 people and the demolition of several buildings, including the local church.
- Niscemi is indexed in the IFFI Inventory of Landslide Phenomena in Italy, managed by ISPRA, indicating historical and ongoing geohazard susceptibility. *Italian Landslide Inventory (IFFI) — IdroGEO platform”*, Online resource. [Online]. Available: https://beta.idrogeo.isprambiente.it/app/iffi/c/85013?@=37.13997767757647,14.393489762905714,14. Accessed: 5-Feb-2026.
- The area of the south perimeter of the urban area was classified as being under high geomorphological risk in the 2006 Sicilian Hydrogeological Asset Plan (PAI) and subsequent updates, with zones of high hazard (P4) and high risk (R3–R4) recorded, marking it as prone to significant slope instability.
  Consult: “Regional Territorial Information System (SITR) – WebGIS platform”, Web map. [Online]. Available: https://www.sitr.regione.sicilia.it/portal/apps/webappviewer/index.html?id=f3f54ac44ae04a3584885eaaf0b84d70. Accessed: *5-Feb-2026*

Despite these recognitions, systematic detailed geological mapping, geotechnical drilling, and in-situ and remote sensing monitoring, such as Satellite InSAR systems, were not established at a scale or frequency sufficient for the early detection of slope destabilisation.

5. Geoscience and Policy: Lessons from Niscemi

The Niscemi landslide highlights four critical areas where geoscience can and must contribute to policy and practice:

1. High-Resolution Geological Mapping and Subsurface Modelling

Detailed geological maps, geological cross-sections, and 3-D subsurface models are essential to understand:

- lithological contrasts,
- groundwater behavior,
- landslide kinematics.

Such data must be integrated with planning instruments and infrastructure design. Existing maps are insufficient for complex hill-slope contexts like Niscemi.

2. Integrated Monitoring and Early Warning Systems

Effective early warning for landslides requires:

- real-time or near real-time sensors (inclinometers, extensometers),
- remote sensing techniques (InSAR, LiDAR repeat surveys),
- integration with meteorological data streams.

Multi-hazard early warning systems should combine geophysical, geological, and climatic indicators to anticipate rapid movements.

3. Human-Centred Risk Communication

Risk information must be accessible and actionable for residents and decision-makers alike, and an appropriate budget should be allocated. Tools include:

- hazard maps linked to mobile alerts,
- community training involving certified geologists,
- public dashboards showing risk levels based on monitoring.

4. Resilient Urban Planning and Nature-Based Mitigation

Urban planning must recognize geological constraints explicitly:

- avoid new construction in high-risk zones unless mitigated,
- implement nature-based solutions (vegetation stabilization, controlled drainage),
- incorporate engineered barriers and slope reinforcement where appropriate.

6. The Role of Professional Geologists

Certified geologists play a unique role in bridging science and practice by:

- interpreting complex subsurface conditions,
- designing monitoring systems,
- supporting local authorities with risk-informed decisions,
- ensuring technical quality in planning and emergency response.

EFG emphasises that professional accreditation and continuous professional development are indispensable to maintain competence standards.

7. Climate Change as a Risk Multiplier

As recognised in the IPCC Sixth Assessment Report (Intergovernmental Panel on Climate Change (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the IPCC*. Cambridge University Press, https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter11.pdf), climate change alters hydro-climatic extremes — intensifying rainfall and increasing rapid saturation events that trigger landslides.

Niscemi should be viewed not as an isolated incident but as:

- part of a growing pattern of climate-related geological hazards in Mediterranean Europe,

- a reminder that risk frameworks must incorporate future climatic scenarios, not just historical records.

8. European Policy Context and the Need for a Landslide Directive

- Landslides are closely linked to soil degradation, deforestation, urbanisation, and extreme weather.
- While EU frameworks such as the Soil Monitoring and Resilience Directive, the Civil Protection Mechanism and the Floods Directive (2007/60/EC) exist, there is no legally binding instrument specifically addressing landslides. Other relevant policies include the Water Framework Directive (2000/60/EC), the Habitats Directive (92/43/EEC), and the Climate Adaptation Strategy, all of which indirectly contribute to slope stability and disaster risk reduction.
- A dedicated Landslide Directive would complement existing policies, creating clear obligations for Member States to prevent, monitor, and respond to landslide hazards. The inclusion of landslide risk in the EU Soil Strategy for 2030 would enhance coherence across sectors.

Key Benefits:

1. Protection of life, property, and infrastructure: Standardised EU rules enable early warning, land-use planning, and emergency preparedness, thereby reducing fatalities and economic losses.
2. Scientific and economic benefits: Common methodologies for hazard mapping, risk assessment, and monitoring would foster data sharing, research, innovation, and cost-effective mitigation.

9. Conclusions and Recommendations

The Niscemi landslide is a powerful reminder that:

- geological risks are predictable in principle, but require investment, data, and governance to be managed effectively,
- Europe needs harmonised standards for geological risk assessment, monitoring, and early warning, integrated into EU climate adaptation and disaster risk reduction policy.

EFG calls on European and national decision-makers to:

1. Advance high-resolution geoscience data infrastructures across all Member States.
2. Support monitoring and early warning systems tailored to local geologies.
3. Strengthen the role of professional geologists in public risk committees.
4. Promote education and risk communication initiatives within communities.

Through informed policy and scientific collaboration, it is possible to reduce the human and economic toll of future geological hazards.

About EFG:

The European Federation of Geologists (EFG) is the largest and most influential network of geoscience professionals across the Council of Europe countries, with 28 national associations representing a direct membership of approximately 50,000 individuals. EFG collaborates extensively with leading geoscience organisations worldwide, including in Australia, the USA, Canada and South Africa, indirectly reaching over 150,000 experts.