ROMANIA

Management of Earthquake Risk

TAFF Technical Assistance Financing Facility for Disaster Prevention and Preparedness

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KEY ACRONYMS

AAR	After-Action Review
ANM	National Meteorological Administration (*Administrația Națională de Meteorologie*)
APIA	Payments and Intervention Agency for Agriculture (*Agenția de Plăți și Intervenție pentru Agricultură*)
BBB	Build Back Better
BCP	Business Continuity Plan
CAP	Common Agricultural Policy
Cat DDO	Catastrophe Deferred Drawdown Option
CatNat	Catastrophes Naturelles
CCM	Climate Change Mitigation
CIES	County Inspectorate for Emergency Situations
CSO	Civil Society Organization
DES	Department for Emergency Situations
DLD	Disaster Loss Data
DRF	Disaster Risk Financing
DRM	Disaster Risk Management
DRMKC	Disaster Risk Management Knowledge Centre
DRR	Disaster Risk Reduction
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EFD	European Fire Database
EFFIS	European Forest Fire Information System
ERDF	European Regional Development Fund
EU	European Union
EUSF	European Union Solidarity Fund
EWS	Early Warning System
FAO	Food and Agriculture Organization of the United Nations
FRMP	Flood Risk Management Plan
GD	Government Decision
GEO	Government Emergency Ordinance
GFDRR	Global Facility for Disaster Reduction and Recovery
GFN	National Forestry Guard
GIES	General Inspectorate for Emergency Situations
GIS	Geographic Information System
GNM	National Environmental Guard (*Garda Națională de Mediu*)
GO	Government Ordinance
GoR	Government of Romania
GWIS	Global Wildfires Information System
ICAS	Institute of Research and Silvicultural Planning (*Institutul de Cercetări și Amenajări Silvice*)
IGAv	General Inspectorate for Aviation (*Inspectoratul General de Aviație*)
IPCC	Intergovernmental Panel on Climate Change
IWFRM	Integrated Wildfire Risk Management
JRC	Joint Research Centre
MApN	Ministry of National Defence (*Ministerul Apărării Naționale*)
MARD	Ministry of Agriculture and Rural Development
MCID	Ministry of Research, Innovation, and Digitalization (*Ministerul Cercetării, Inovării și Digitalizării*)

MDPWA	Ministry of Development, Public Works, and Administration
MEWF	Ministry of Environment, Water, and Forests
MoE	Ministry of Education
MoF	Ministry of Finance
MoH	Ministry of Health
MoIA	Ministry of Internal Affairs
MoT	Ministry of Transportation
NBS	Nature-Based Solution(s)
NCCS	National Climate Change Strategy
NCES	National Committee for Emergency Situations
NDC	Nationally Determined Contribution
NDRMP	National Disaster Risk Management Plan
NDRRS	National Disaster Risk Reduction Strategy
NECP	National Energy and Climate Plan
NFR	National Forestry Registry
NFS30	National Forest Strategy 2030
NGO	Nongovernmental organization
NPDRR	National Platform for Disaster Risk Reduction
NRA	National Risk Assessment
NRRP	National Recovery and Resilience Plan
NSCCA	National Strategy for Climate Change Adaptation
NSRRS	National Seismic Risk Reduction Strategy
OPD	Organizations of Persons with Disabilities
PAD	Policy against Natural Disasters (*Polița de Asigurare împotriva Dezastrelor Naturale*)
PAID	Pool for Natural Disaster Insurance (*Pool-ul de Asigurare Împotriva Dezastrelor Naturale*)
PPP	Public-Private Partnership
PRAF	Peer Review Assessment Framework
PwDs	Persons with Disabilities
RO-RISK	Government of Romania National Risk Assessment
RRF	Resilience and Recovery Facility
SFDRR	Sendai Framework for Disaster Risk Reduction
SMEs	small and Medium Enterprises
SMURD	Mobile Emergency Service for Resuscitation and Extrication (*Serviciul Mobil de Urgență, Reanimare și Descarcerare*)
SNMSU	National Emergency Situations Management System (Sistemul Naţional de Management al Situaţiilor de Urgenţă)
SPSU	Private Emergency Services (*Serviciul Privat pentru Situații de Urgență*)
SVSU	Volunteer Emergency Services (*Serviciul Voluntar pentru Situații de Urgență*)
TAFF	Technical Assistance Financing Facility
UAT	Territorial Administrative Unit (*Unități Administrativ Teritoriale*)
UCPM	Union Civil Protection Mechanism
UNDRR	United Nations Office for Disaster Risk Reduction
UNSAR	National Union of Insurance and Reinsurance Companies in Romania (Uniunea Națională a Societăților de Asigurare și Reasigurare din România)
WUI	Wildland-Urban Interface
WWF	World Wide Fund for Nature

KEY TERMS

Earthquake risk is understood as the combination of seismic hazard (for example, the frequency of earthquake occurrence, the strength of ground shaking given an earthquake), exposure (for example, the number of people exposed, the value of assets exposed), and vulnerability (for example, the susceptibility of assets to damage, the ability of populations to cope with earthquake effects).

Hazard: A potentially destructive physical phenomenon, such as a natural hazard (e.g., earthquake, wildfire).

Exposure: The situation of people, infrastructure, housing, production capacities, and other tangible human assets located in hazard-prone areas.

Vulnerability: The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards.

Earthquake magnitude is a quantitative measure of the size or energy released by an earthquake at its source. It is determined using seismic data and reflects the amplitude of seismic waves recorded by seismographs. The most common magnitude used today is the moment magnitude scale (Mw), which largely replaced older scales such as the Richter scale. Unlike intensity, which measures the observed effects of an earthquake at specific locations, magnitude provides a standardized measure of an earthquake's overall strength, regardless of where it is measured.

Earthquake shaking intensity measures the strength of ground shaking at a specific location and its effects, such as damage or human perception. Intensity varies with distance from the epicenter and local site conditions. In Europe, a commonly used intensity scale is the European Macroseismic Scale (EMS-98), which ranges from I (not felt) to XII (completely devastating) and is based on observed effects on people, buildings, and infrastructure. Another widely used intensity scale is the Modified Mercalli Intensity (MMI) scale, which is used in the United States and other regions. Quantitative measures like Peak Ground Acceleration (PGA) and similar parameters are also used in engineering design and seismic assessment and are based on ground motion recorded by instruments.

Secondary perils: Also known as earthquake-triggered perils, are hazards that are triggered by the primary earthquake event. These include landslides, soil liquefaction, tsunamis, and fire following, which can significantly increase the overall damage, losses and disruption.

Earthquake risk assessment: A process that combines hazard, exposure, and vulnerability information to assess expected infrastructure and human losses after an earthquake. Typically, this involves probabilistic calculations considering a range of hypothetical earthquake scenarios.

Microzonation: Microzonation studies involve geological and geotechnical surveys and analysis, which are used to create detailed maps of seismic hazards in an area. This information can be incorporated into building codes, inform territory and land use management, and guide post-earthquake reconstruction.

Building code: A set of ordinances or regulations and associated standards intended to regulate aspects of the design, construction, materials, alteration, and occupancy of structures necessary to ensure human safety and welfare, including resistance to collapse and damage.

Early warning systems (EWS) are integrated systems that disseminate timely and meaningful information to users threatened by a hazard. These systems can enable protective actions to reduce harm posed by the hazard. Some examples of EWS include sirens, text messages/SMS, and TV or radio broadcasts. Additionally, different hazard types may require different technical capabilities and infrastructure. For earthquakes, EWS typically provide post-event information such as earthquake details and impact estimations, public advisories and aftershock potential. EWS can also include earthquake early warning (EEW) which are alerts that give imminent notice before shaking begins, but these are not widely implemented.

Earthquake early warning (EEW) involves detecting initial ground shaking and rapidly notifying end users before imminent, stronger ground shaking. The lead time between notification and stronger ground shaking varies by location, depending on factors such as the density of seismic stations in the area, the distance from the epicenter, and the data telemetry/EEW algorithm performance. While EEW can be a part of the EWS, they are highly specialized and location specific and are not widely available.

Coping capacity: The ability of people, organizations, and systems, using available skills and resources, to manage adverse conditions, risks, or disasters.[1]

[1] Mysiak, Jaroslav, Veronica Casartelli, and Silvia Torresan. 2021. *Union Civil Protection Mechanism - Peer Review Programme for Disaster Risk Management: Assessment Framework. Euro-Mediterranean Center on Climate Change (CMCC).* Link.

Resilience: The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including ensuring the preservation, restoration, or improvement of itsessential basic structures and functions.[2]

'Build back better' (BBB) principle: The use of the recovery, rehabilitation, and reconstruction phases after a disaster to increase the resilience of nations and communities by integrating disaster risk reduction measures into the restoration of physical infrastructure and societal[3] systems and into the revitalization of livelihoods, economies, and the environment.

Damage: Total or partial destruction of physical assets existing in the affected area. Damage occurs during and after the disasters and is measured in physical units (that is, square meters of housing, kilometres of roads, and so on).[4]

Losses refer to indirectly quantifiable losses (declines in output or revenue, impact on well-being, disruptions to flow of goods and services in an economy), or additional operational costs associated with response and initial repairs.

Reconstruction: The medium- and long-term rebuilding and sustainable restoration of resilient critical infrastructures, services, housing, facilities, and livelihoods required for the full functioning of a community or society affected by a disaster, aligning with the principles of sustainable development and BBB to avoid or reduce future disaster risk.

Rehabilitation: The restoration of basic services and facilities for the functioning of a community or society affected by a disaster.

[2] World Bank and European Commission. 2021. *Economics for Disaster Prevention and Preparedness: Investing in Disaster Risk Management in Europe Makes Economic Sense, Background Report*. Link.

[3] The term 'societal' should not be interpreted as a political system of any country.

[4] World Bank. 2021. *Investment in Disaster Risk Management in Europe Makes Economic Sense Background Report. Economics for Disaster Prevention and Preparedness.* Link.

EXECUTIVE SUMMARY

Romania is one of the most earthquake-prone countries in the European Union (EU). The national risk assessment (NRA, RO-RISK) identifies earthquakes as the country's top hazard, potentially affecting over half of the country. Romania's capital city, Bucharest, with its dense population and aging building stock, is among Europe's most vulnerable urban areas.[5] With estimated annual average losses[6] of €512 million and potential large-scale damage and long-term impact on society, Romania's earthquake risk underscores the urgent need to assess evolving risk trends and strengthen national earthquake response capacity.

Romania has made several important efforts in seismic risk management. These include developing a national strategic framework in line with international standards, reinforcing the legislative framework, updating building codes, and streamlining the institutional set-up to foster greater cooperation among key stakeholders. Building on progress and lessons learned, Romania is intensifying efforts to enhance the resilience of its built environment and communities to earthquakes while strengthening response. To further strengthen seismic risk management in Romania, opportunities exist in enhancing legal frameworks, improving coordination, updating risk assessments, strengthening public administration, developing disaster risk financing strategies, and creating a multi-hazard recovery framework integrating the 'build back better' (BBB) principle. Strengthening cross-sectoral coordination and accountability through clear mandates, guidance, and performance monitoring can help embed risk reduction more effectively into all relevant sectors. To address all types of infrastructure, sectoral ministries must develop specific strategies, programs, or action plans, including strategic or nationally significant infrastructures.

This report offers a rapid review of earthquake risks and risk management capacity, investment needs, and recommendations to inform policy dialogue and future research. Capacity considers earthquake risk governance, risk understanding, risk reduction and mitigation, preparedness and early warning, readiness and response, recovery and post-disaster financing, and cross-cutting topics such as social resilience and the private sector. Each section reviews the current arrangements, key challenges, and opportunities for improvements relevant to Romania. The findings aim to inform national and EU decision-making and contribute to ongoing policy and investment dialogue as well as future research.

[5] Reported by the Earthquake Risk across Europe website. Link.

[6] World Bank and European Commission. 2021b. *Financial Risk and Opportunities to Build Resilience in Europe. Economics for Disaster Prevention and Preparedness*. Link.

KEY MESSAGES

The following key messages can be highlighted based on the review of earthquake risks and risk management capacity in Romania:

1. Romania faces high seismic risk due to its location and the concentration of aging infrastructure in densely populated areas. A major earthquake in the Vrancea seismic zone, which has modelled maximum magnitude of 7.4–8.1, could affect over two-thirds of the country, including dense urban areas. Almost 72 percent of urban housing is concentrated in multi-story buildings, with 67.6 percent of these built between 1961 and 1980,[7] before seismic codes were established.

2. Earthquakes could cause severe damage to infrastructure and increase socioeconomic disparities. A repeat of the 1977 earthquake is projected to cause even greater damage today, affecting half the country, damaging over 350,000 homes, and resulting in more than 45,000 serious injuries or deaths.[8] Critical infrastructure is also vulnerable. It is estimated that over 60 percent of Romania's emergency response assets are at risk of strong seismic shaking in a 1-in-50-year earthquake. More than 1,000 educational facilities are at risk from strong seismic shaking, and 70 percent of the existing hospital beds in Romania are in high- or medium-seismic-hazard areas.[9] Marginalized and low-income communities are disproportionately exposed and would face even greater barriers to recovery, further deepening existing socioeconomic disparities in the aftermath of a major disaster.[10]

3. Romania's approach to seismic risk management is based on a comprehensive legal framework. Romania has national codes aligned with the Eurocode. It also has a National Seismic Risk Reduction Strategy (NSRRS) with an accompanying implementation plan, which seeks to create a greener, more resilient, and inclusive built environment by 2050. The policy and institutional framework is coordinated primarily by the Ministry of Development, Public Works, and Administration (MDPWA), especially with respect to prevention and reconstruction, with the Ministry of Internal Affairs (MOIA) leading response efforts and line ministries as well as subnational authorities involved in the implementation of policies and programs.

4. Romania has risk assessment processes and several methodologies in place; however, gaps remain in the use and accessibility of risk information. The national risk assessment (RO-RISK) is pending the next update, requiring new hazard maps and dynamic risk mapping. Funding is needed to expand countrywide microzonation efforts currently under way in two pilot cities. Romania has a recently established methodology for collecting building data in a tiered manner to prioritize retrofitting, alongside ongoing efforts to build local administrative capacity. An integrated National Building Registry and databases with relevant seismic information for improved land planning are needed.

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[7] MDPWA (Ministry for Development, Public Works and Administration). 2022. *National Housing Strategy 2022–2050*. Link.

[8] MoIA (Ministry of Internal Affairs). 2021. National Post-Earthquake Response Concept (Second Edition). Link.

[9] GoR 2022, 20–23.

[10] Kerblat, Yann, Ali Arab, Brian James Walsh, Alanna Leigh Simpson, and Stephane Hallegatte. 2021. *Overlooked: Examining the Impact of Disasters and Climate Shocks on Poverty in the Europe and Central Asia Region (English)*. World Bank Group. Link. The World Bank's Unbreakable report (Hallegatte et al. 2017) first introduced well-being loss and socioeconomic resilience, suggesting policies to reduce asset losses or enhance recovery through financial inclusion and insurance. This framework adds socioeconomic resilience as a fourth component to traditional risk assessments, focusing on how effectively households maintain well-being despite disasters. Link.

5. Romania has been investing in seismic risk reduction through various programs; however, awareness and commitment among line ministries to integrate earthquake risk reduction into their sectoral responsibilities—such as maintaining the functionality of health, energy, and communications systems post-earthquake—are limited. Laws and programs are in place to support the seismic rehabilitation of high-risk buildings, including the so-called 'red dot' structures, with government-funded expertise, risk assessments, energy audits, and post-intervention certificates. The MDPWA runs the National Program for the Consolidation of Buildings with High Seismic Risk, aiming to improve seismic safety and energy efficiency in residential and public buildings, while the World Bank supports seismic risk reduction with over €330 million in projects targeting critical infrastructure like emergency assets (police, fire, and gendarmerie facilities) and schools. Progress in Bucharest has been slow so far, with only six of 849 high-risk buildings under work as of April 2025. However, efforts are being made by the Municipality of Bucharest, through its specialized structure (Municipal Administration for Retrofitting of Seismic Risk Buildings), to accelerate progress, but low public trust in the programs, unclear communication on costs, and unaffordable retrofitting for vulnerable groups stall the process.

6. Romania has made significant strides in preparing the population for seismic events through national awareness campaigns and regular public alarm drills, such as 'Be Prepared Caravan'. It has a robust general early warning system (EWS), a comprehensive network of seismic observatories integrated into international frameworks, and a functional earthquake early warning system (EEWS) that informs critical services. However, public access to EEWS remains limited to avoid panic. Romania has a national platform, 'Fii Pregătit', featuring accessible, internationally aligned guides, inclusive public training, and a national public awareness and risk communication guide under the 2024 national DRR strategy. The RO-ALERT warning system is being upgraded for improved functionality and accessibility, while the electronic siren network still requires expansion, modernization, and regular maintenance.

7. The National Post-Earthquake Response Concept in Romania enhances operational capacities and coordination at all levels to protect life and property during earthquakes. Romania has a robust national emergency response system featuring a clear command structure, integrated decision-making, and inter-agency cooperation. Its rescue capacity includes emergency personnel, voluntary, and private services, supported by the Civil Society Relations Department to enhance collaboration with civil society organizations (CSOs). Annual exercises since 2016, including the national SEISM 2025 exercise in June 2025, test the response framework. Training is provided through a robust network of national and regional centers, and specialized teams like the UN-certified RO-USAR assist in EU Union Civil Protection Mechanism operations, including in Albania and Türkiye. However, evacuation plans, and emergency shelter information are lacking, hindering self-evacuation, and persons with disabilities (PwDs) still face barriers in emergencies despite recent improvements.

8. **While efforts are being made to update its damage and loss methodology, Romania lacks a formal disaster/ earthquake recovery framework and unified damage assessment methodology**. Some key areas where updates are needed include clarification of roles at the sub-national level, creating a more comprehensive plan for recovery and reconstruction after 72 hours post-event, except for what is already briefly touched upon in current legislation (MDPWA's regulations on post-disaster responsibilities, GD No. 557/2016, and the National Post-Earthquake Response Concept), and active integration of principles to 'build back better'. MoIA is developing a digital platform and unified methodology to improve data collection and automate impact assessments.

9. **Romania has made steps in understanding potential macrofiscal impacts from earthquakes and increasing its financial resources, yet more could be done to strengthen financial resilience**. Romania's Fiscal-Budgetary Strategy 2022–2024 and the Fiscal-Budgetary Strategy 2024–2026 consider potential macrofiscal impacts of earthquakes. It has disaster funding through the Ministry of Finance's Reserve and Intervention Funds, and since 2024, also €466.9 million in contingency financing.[11] However, among the broader public, while insurance is mandatory, penetration levels are low —particularly in rural areas—due to several reasons.

10. **Efforts are ongoing to strengthen social resilience, which could be leveraged along with greater focus on private sector resilience**. Romania faces deep regional disparities, the highest poverty rate in the EU, and significant vulnerability among groups such as PwDs, older persons, rural and Roma populations, and women—who are disproportionately affected by disasters, which exacerbate inequality and gender-based violence (GBV)—while the social protection system lacks integration of disaster and poverty data. The private sector, especially small and medium enterprises (SMEs), is highly vulnerable to the impacts of earthquakes and remains underprepared with few business continuity plans in place and limited engagement in response and recovery planning.

[11] World Bank. Romania Second Disaster Risk Management Development Policy Loan with a Cat DDO.Link

PRIORITIES GOING FORWARD

Going forward, Romania can benefit by prioritizing investments across prevention, preparedness, and response phases to effectively manage and reduce earthquake risks.

Romania could continue to focus on a comprehensive approach that spans prevention, preparedness, response, and recovery, including the following key areas:

1. Continue updating the legal framework and existing plans and strategies, particularly with respect to seismic prevention needs, with stronger focus on operationalization, increased support at the local level, improved vertical coordination and information flow between all stakeholders at all levels, and optimizing staffing and technical capacity across all levels and hazards according to risk level. Ensure sufficient financial coverage to implement relevant strategic frameworks.

2. Continue reforming building codes and norms in alignment with European standards. This includes focusing on the development of missing P100 sections, such as P100-8 and P100-2, with resources needed to ensure relevant technical expertise for drafting reform documentation, compliance supervision, and training of relevant authorities and actors.

3. Update and create more dynamic seismic risk assessments, integrating relevant information into local planning processes and strengthening capacities to use such information effectively. Key actions could include updating seismic risk assessments to cover all regions, heritage structures, critical infrastructure, and secondary hazards as well as updating and improving planning processes and methodologies to integrate risk assessments at local and county levels (for example, operationalize the National Building Registry and ensure its population with relevant data). In parallel, there is a need to strengthen capacity in public administration for risk assessment and management, particularly in understanding earthquake risk to inform prevention and preparedness actions/investments.

4. Continue to invest in public awareness and early warning. This includes investments in infrastructure for renewing and integrating electronic sirens, modern digital platforms, communication systems, and devices to improve early warning effectiveness and accessibility. Enhance inclusive seismic preparedness by scaling up national initiatives, securing life-saving tools (for example, automated external defibrillators [AEDs] and first aid kits) for schools and communities, modernizing risk awareness resources and equipment, and expanding the Be Prepared (Fii Pregătit) platform to include resources for children and accessible content, and other options, such as mobile and other online solutions for community preparedness and education.

5. Continue to strengthen emergency response capacity, including professional emergency response staff, volunteers (including youth and young professionals), and CSOs, and engage the private sector meaningfully. This could be done by expanding training, upgrading facilities and systems, incorporating modern tools, and tailoring programs to improve the national emergency response system, enhancing the existing MOIA-led command-and-control system. Evacuation routes, emergency shelters, and pre-positioned stockpiles must be established, mapped, and communicated to the public in an accessible manner, regularly maintained, and ensured to remain resilient and functional in the event of a disaster.

6. Strengthening community preparedness also requires focus on inclusive approaches, such as training programs and solutions for customizing alerts for vulnerable communities, including PwDs and other vulnerable groups, universally accessible shelters, and disability-accessible services. Integrate social benefits and adaptive social protection measures, such as emergency cash transfers, to enhance the inclusivity and effectiveness of disaster risk management and social protection systems in the event of an earthquake.

7. Develop a standardized methodology for collecting damage and loss data and enhance data sharing (that is, platforms). While improving data management systems, it is essential to build capacity at all levels, especially within local public administration, and to develop disaster loss tracking tools that ensure accurate and timely information.

8. Create a comprehensive post-earthquake recovery framework incorporating BBB principles for reconstruction that aligns roles, responsibilities, procedures, and funding across all levels of government, the private sector, and civil society. Lay the foundation for an integrated, multi-hazard national disaster recovery framework/plan, beyond completing ongoing efforts concerning damage and loss methodology and systems.

9. Continue to pursue greater understanding of potential macrofiscal risk and the adoption/updating of a range of financial instruments for emergencies and post-disaster recovery. Regularly review and update disaster risk financing and insurance arrangements, including opportunities to expand insurance coverage and the quality of services provided.

10. Continue efforts to strengthen inter-institutional and inter-ministerial communication and coordination, as well as collaboration between public authorities, the private sector, civil society, and the public. This may include optimizing current HR strategies at ministerial levels, streamlining collaboration and communication procedures, supporting multi-stakeholder risk platforms, and promoting community-based preparedness programs. Having incentives for private sector business continuity planning, expanding public-private insurance products and financing opportunities and solutions for retrofitting, and providing information in an accessible and transparent manner about seismic risk, ongoing risk reduction, and retrofitting programs and costs, as well as preparedness, response, and recovery efforts are also important.

INTRODUCTION

This report is part of a series aimed at improving the understanding of the needs and priorities for disaster resilience investments in relation to two disaster risks: wildfires and earthquakes. The broader objective is to provide actionable insights and recommendations to help the European Union (EU), and its Member States make informed, strategic investments to enhance resilience against wildfires and earthquakes.

This report focuses on earthquakes and describes current risk trends, risk management capacity, and investment needs and recommended approaches for Romania. To provide further perspectives, this note is complemented by two other country-specific case studies for Croatia and Cyprus, as well as a note looking at earthquake risk management based on existing information and data gathered across EU Member States.[12]

This report provides a rapid high-level overview based primarily on already existing information and data. Consultations with key national and EU organizations and researchers have been conducted to improve understanding of the key areas listed above. The note can serve to inform policy dialogue and future research.

The analysis is structured following the Union Civil Protection Mechanism (UCPM) Peer Review Assessment Framework.[13] The approach also considers the following disaster risk management (DRM) elements, which have been applied in this note with focus on earthquake risk:

[12] Overseas Countries and Territories are not considered.
[13] Mysiak, Casartelli, Torresan. 2021.

1. **Governance of risk management** focuses on the overall governance framework for risk management, including the strategies, institutional frameworks, coordination mechanisms, financing strategies, and systemic resilience related to disaster risk at the national and subnational levels.

2. **Understanding risk management** examines the identification, analysis, evaluation, communication, and capacities associated with assessing disaster risks.

3. **Risk prevention, risk reduction, and mitigation** analyze prevention and explore legislative reforms, development and enforcement of building codes, integration of hazard considerations into land planning and documents, and retrofitting efforts and administrative capacities related to disaster prevention.

4. **Earthquake early warning systems (EEWSs) and public awareness** covers preparedness activities, awareness campaigns, EEWSs including other alerting systems (for example, electronic sirens), public preparedness training and exercises, and the overall development of response capacities of civilians.

5. **Earthquake preparedness and emergency response** focus on pre-earthquake measures to ensure an effective response, including rescue capacity, training, and situational awareness, whereas earthquake emergency response includes (i) the activities and processes regarding the response phase of a seismic event, including emergency and evacuation plans, training and exercises for emergency personnel, and operational measures to reduce impacts and (ii) the framework concerning the actions taken in the immediate aftermath to days or weeks after an event.

6. **Recovery, reconstruction, and post-disaster financing** cover the processes and actions taken after a disaster event, including damage assessment, restoration efforts, and recovery planning.

7. **Cross-cutting topics:** social resilience, protection and inclusion explores ways to address the disproportionate impact of disasters on vulnerable populations, with special focus on PwDs proposing adapted measures and tailored solutions to increase inclusion. Meanwhile, private sector covers relevant stakeholders' involvement in the context of earthquake risk management, including building owners and property managers, insurance companies, business owners, utility providers, construction and engineering firms, CSOs and so on.

EARTHQUAKE RISK PROFILE AND RISK TRENDS

This chapter provides a short overview of risk trends for earthquakes in Romania. It draws on available data and information and focuses on the tectonic regime and hazard, drivers of risk, and exposure across sectors while also shedding light on locations with high concentrations of risk. It also offers a comparison of seismic risk to other EU countries and provides insight into and estimates of expected future risk trends.

Disaster risk context

Romania is highly vulnerable to the impacts of natural hazards, including floods, earthquakes, droughts, landslides, wildfires, and extreme weather events.[14] Over recent decades, disaster events have resulted in significant physical, social, and financial impacts, affecting human well-being.[15] Since 1980, Romania has experienced €12 billion in losses (with some 99 percent of those not insured) from climatological and hydro-meteorological events, with estimated annual losses of €585 million from floods.[16] Romania also faces high seismic risk, and in combination with aging (and energy-inefficient) infrastructure, it faces the third highest loss ratios in the EU, with modeled annual losses for earthquake totaling €512 million. In 2022, Romania suffered over €1 billion in lost revenue for the agricultural sector due to droughts and wildfires in the southeastern region,[17] receiving almost €34 million from the European Union Solidarity Fund (EUSF) to cover part of the needs.[18] Climate change is expected to exacerbate the incidence and severity of weather-related disasters and their impacts, with increased threats of forest fires, landslides, floods, strong winds, and heatwaves.[19]

TECTONIC REGIME AND HAZARD

The Vrancea subcrustal source is Romania's most potent seismic zone, influencing more than two-thirds of the country and extending into neighboring Moldova and Bulgaria. Located at intermediate depths in the Carpathian curvature, driven by the convergence of the Eurasian, Moesic, and Intra-Alpine tectonic plates, the zone generates powerful earthquakes with significant impact and minimal attenuation.[20] The current seismic code (P100-1/2013) uses a probabilistic approach to map seismic hazard, dividing Romania into seven seismic zones and setting safety requirements for new buildings, but it does not incorporate terrain classification as seen in Eurocode 8. Other seismic sources in Romania, like Banat and Dobrogea, have localized activity but can also cause significant impacts, affecting up to 10 percent of the population.[21] The distribution of seismic hazard is not even across the country but is concentrated in the southern and eastern regions (Figure 1) which are likely to continue to experience significant casualties and economic losses due to future strong earthquakes.[22]

IMPACTS OF PAST EARTHQUAKES

Romania is a country with significant seismic potential and a notable history of major earthquakes (Table 1), although it has not experienced a catastrophic event since the devastating earthquake of 1977, almost five decades ago. Major past earthquakes include those in 1940 (M7.3, around 1,000 fatalities), 1977 (M7.5, 1,641 fatalities), and 1990 (M6.7, 14 fatalities)[23], while the strongest in the past 20 years occurred on October 27, 2004, in Vrancea (M6.0, 98.6 km deep), without casualties or damage. The earliest reference to an earthquake in the territory of present-day Romania dates back to the year 455, while the oldest with a confirmed date occurred on August 29, 1471—when nearly all houses in Brașov and churches in Târgoviște collapsed. In 1802, chroniclers described the "Great Earthquake" as lasting two minutes. The 1940 event devastated Panciu and led to the collapse of Bucharest's Carlton building, killing over 100. After the 1989 Revolution, the strongest quake hit in 1990 and since then, ten more earthquakes of at least 5.5 magnitude have been recorded. Additionally, historical records mention tsunamis in the Black Sea triggered by earthquakes, as well as soil eruptions, and aftershocks—some lasting for days—with significant impacts extending to neighboring countries, particularly Bulgaria, Ukraine, and the Republic of Moldova.[24]

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[14] The national risk assessment (NRA) (RO-RISK project) identifies 10 key natural risks (e.g., earthquakes, floods, droughts, forest fires, landslides), technological risks (e.g., nuclear and radiological risks, major industrial accidents involving hazardous substances [SEVESO], including major transportation accidents with dangerous goods), biological risks (e.g., epidemics, epizootic diseases, and zoonoses), and extreme weather events (e.g., storms and blizzards, heavy snowfalls, tornadoes, and extreme temperatures).

[15] EM-DAT–The International Disaster Database. Link. Between 1900 and 2023, 103 catastrophic events (including 53 floods, 11 earthquakes, 21 extreme weather events, 13 storms, and two droughts) affected over 2 million people, caused nearly 5,000 deaths, and resulted in over US$17.2 billion in damage.

[16] Munich Re, NatCatService—data on natural disasters since 1980, cited in World Bank. 2023b. *Systematic Country Diagnostic Update: Romania*. Link.

[17] Dumitrescu, R. 2022. "Drought Wipes EUR 1 bln from Romanian Agricultural Sector." *Romania Insider*. Link.

[18] World Bank. 2024b. *Financially Prepared: The Case for Pre-Positioned Finance*. Link.

[19] See IPCC. Sixth Assessment Report - Regional Data - Europe of the Intergovernmental Panel on Climate Change. Link.

[20] The average annual number of earthquakes with magnitudes over 5.0 in Vrancea is 1.8, but accurate earthquake prediction is hindered by data and model limitations.

[21] NCES 2020.

[22] The estimated annual average risk to life is 275 fatalities, with seismic risk concentrated in eastern Romania, including Bucharest, Bacau, and Prahova.

[23] World Bank and European Commission 2021.

[24] Earthquakes in Romania. MOBEE Project. National Institute for Earth Physics. Link.

DRIVERS OF RISK AND EXPOSURE ACROSS SECTORS

According to the National Housing Strategy 2022–2050, Romania faces significant aging of its housing stock, with many urban units requiring urgent maintenance and rehabilitation, especially in marginalized areas. The World Bank estimates Romania as having the third highest annual seismic risk in the EU, with an average annual loss (AAL) of €512 million, primarily due to modeled residential building damage.[25] In the 2011 census, there were 7.4 million families and 8.7 million housing units, with 98.6 percent privately owned. Nearly 72 percent of urban housing is in multi-story blocks, many of which exceed their useful life and suffer from insufficient maintenance. In urban areas, 67.6 percent of housing is in apartment buildings built mostly between 1961 and 1980, needing maintenance due to physical degradation. Multifamily buildings constructed between 1947 and 1989 are also affected, requiring energy efficiency interventions. Older buildings, especially those built before 1947 and some from the communist period, require extensive interventions, including seismic adaptation and urban regeneration. Additionally, marginalized areas, affected by poverty and unsanitary conditions, require integrated rehabilitation interventions.[26]

Understanding sector-specific seismic exposure is crucial for targeted risk management strategies.[27] In Romania, the seismic exposure of buildings varies significantly across different sectors and is linked to occupancy rates and the function of the buildings, based on data used to develop the National LTRS. The country has over 5.5 million buildings, with residential structures making up more than 90 percent of the total built area, followed by educational and commercial buildings. Occupancy rates in educational and health care buildings significantly affect casualty risks during earthquakes, highlighting the need for detailed data and tailored intervention strategies for these sectors. Educational buildings often have higher occupancy during school hours, while health care buildings, such as hospitals, are fully occupied 24/7. This increases their vulnerability during an earthquake, as the higher occupancy raises the risk of casualties, and damage to essential services like hospitals can disrupt critical community support. In the education sector, 50 percent of students and 45 percent of buildings are exposed to medium seismic hazards, with 7 percent of students and 11 percent of buildings at high hazard. In the health care sector, of the 3,100 classified buildings, 14 percent are RS1 (highest risk), 30 percent are RS2, and 10 percent of hospital beds are located in high-risk areas, while over 60 percent are in moderate-risk areas with limited information on past rehabilitation for health care facilities, necessitating further technical analysis and validation.[28] Residential buildings mostly face medium seismic hazards (57 percent) with 12 percent at high seismic hazard. Romania also has a significant number of culturally valuable heritage buildings, which require specialized seismic risk reduction strategies to preserve their historical value while ensuring safety.[29] The Cultural Heritage Information System (*Sistemul Informatic pentru Patrimoniu Cultural Imobil,* SIPCI) is being developed to manage and evaluate these assets. Commercial and office buildings, which are privately owned, lack specific seismic data, making it challenging to assess their risk and plan appropriate mitigation measures.[30]

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[25] World Bank and European Commission. 2021.

[26] MDPWA (Ministry for Development, Public Works and Administration). 2022. *National Housing Strategy 2022–2050*. Link.

[27] GoR 2022.

[28] GoR 2022, 20–23.

[29] Moreover, approximately 30,200 historical monuments, of which 18,000 are architectural monuments and 14,000 are civil and religious buildings, are exposed to seismic risk.

[30] GoR 2022.

LOCATIONS WITH HIGH CONCENTRATIONS OF RISK

Considering socioeconomic resilience[31] in addition to hazard, exposure, and physical vulnerability, socioeconomic disparities, particularly in the northeastern regions, increase disaster vulnerability and hinder recovery efforts. Limited access to financial support, health care, and education exacerbates poverty and complicates recovery for affected communities. Marginalized areas[32] (Figure 3)—both urban (informal/social housing) and rural (isolated communities)—are especially at risk, with about 6.2 percent of the rural and 3.2 percent of the urban populations residing in these regions, which increases exposure to risks like floods, earthquakes, and climate-related hazards while having scant resources for recovery. Many rural marginalized areas are small, have a high representation of Roma communities, and are geographically isolated, making intervention challenging.

COMPARISON OF RISK TO OTHER EU COUNTRIES

Romania, along with Türkiye, Greece, Albania, and Italy, faces high seismic risk—the main drivers of the earthquake risk being an old building stock, high earthquake hazard, and densely populated urban areas.[33] Cities such as Bucharest, Istanbul, Izmir, Catania, Naples, and Athens face high earthquake risk, with 'very high' risk areas potentially incurring up to €65 million in annual losses and more than 30 fatalities, while 'moderate' risk areas could see up to €25 million in losses and two fatalities annually. Moreover, urban areas in Türkiye, Italy, Romania, and Greece experience the highest earthquake risk, contributing to almost 80 percent of Europe's €7 billion annual economic loss from earthquakes.[34] Romania, alongside Italy, Bulgaria, and Portugal, are among the countries expected to face the highest number of earthquake-related fatalities, are expected to see a reduction in this risk by 2050 due to projected population decline.[35]

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[31] Kerblat, Yann, Ali Arab, Brian James Walsh, Alanna Leigh Simpson, and Stephane Hallegatte. 2021. *Overlooked: Examining the Impact of Disasters and Climate Shocks on Poverty in the Europe and Central Asia Region (English)*. World Bank Group. Link. The World Bank's Unbreakable report (Hallegatte et al. 2017) first introduced well-being loss and socioeconomic resilience, suggesting policies to reduce asset losses or enhance recovery through financial inclusion and insurance. This framework adds socioeconomic resilience as a fourth component to traditional risk assessments, focusing on how effectively households maintain well-being despite disasters. Link.

[32] Tools like the *Atlas of Urban Marginalized Communities in Romania* and the *Atlas of Marginalized Rural Areas and Local Human Development in Romania* highlight the concentration of these areas, particularly in the North-East region, but lack detailed municipal data for targeted interventions.

[33] According to the 2020 European Seismic Hazard Model. Link.

[34] Reported by the Earthquake Risk across Europe website. Link.

[35] World Bank and Global Earthquake Model. *Regional Risk Assessment of the European Union Member States. Issue 2.*

Figure 1. National Seismic Hazard Zoning Map

Source: Pavel et al. 2016.

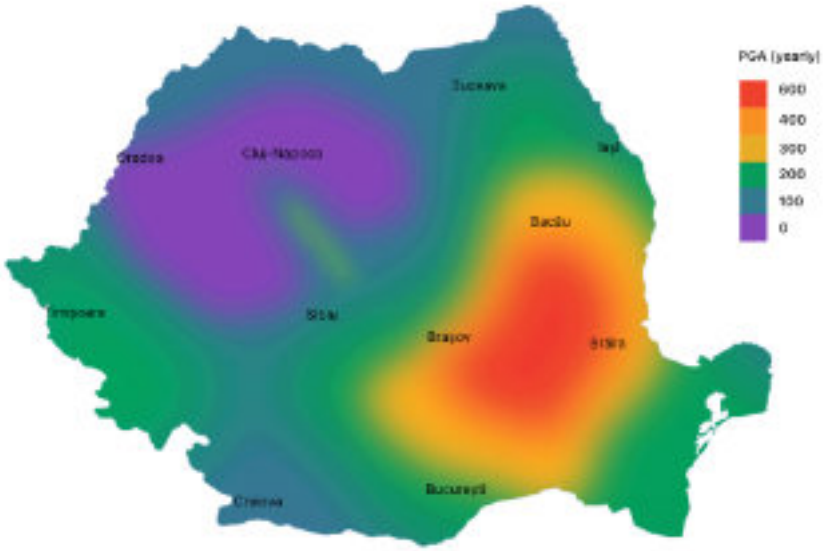
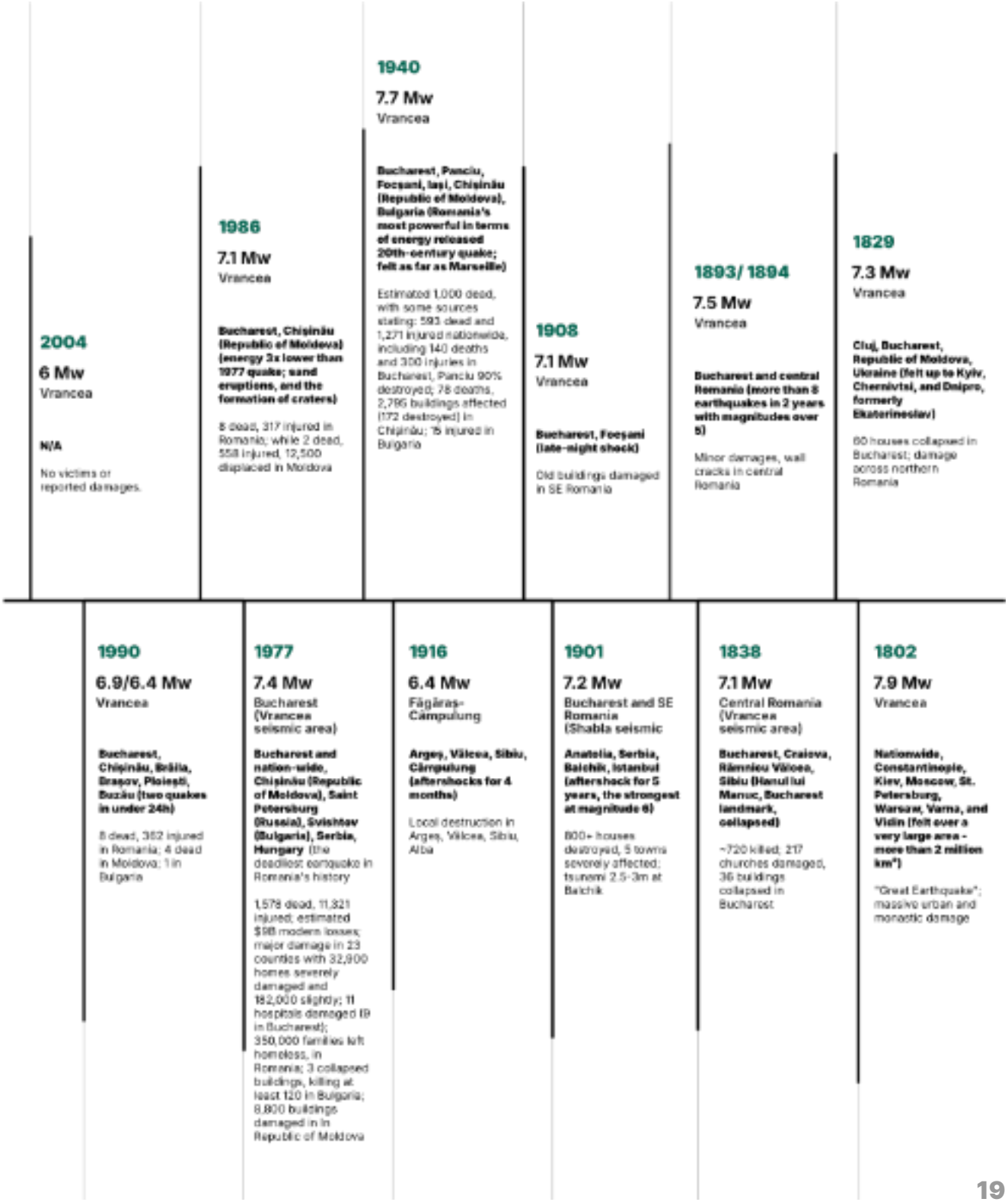


Table 1. Severe earthquakes (over M6) in Romania from the fifteenth century to 2025

Source: Earthquakes in Romania. MOBEE Project, National Institute for Earth Studies in Romania. Link, and publicly available information.



1793

6.2 Mw

Făgăraș-Câmpulung

Transylvania

Damage to Bistrița Monastery (uncertain), church damages in Codlea/Brașov; minor damages in Sibiu

1738

7.7 Mw

Vrancea

Felt widely including Bucharest, Serbia and Bulgaria

Major damage in Bucharest, 11 monasteries destroyed in Moldova; structural damges in Niš (Serbia) and Nikopol (Bulgaria).

1681

7.1 Mw

Vrancea

Nation-wide

Significant structural damages in Brașov

1605

7.1 Mw

Vrancea

Transylvania (Sibiu, Alba Iulia, Cluj, Oradea, Hunedoara)

Structural damages in Brașov

1590

6.0/7.3 Mw

Făgăraș-Câmpulung/Vrancea

Brașov, Turkey, Greece

Many houses destroyed in Brașov

1516

7.5 Mw

Vrancea

Brașov, Suceava

Major damage in Brașov: Houses and city walls damaged and/or collapsed

1790

7.1 Mw

Vrancea

Bucharest, Republic of Moldova and Ukraine

House destroyed in Bucharest, damage in Chișinău and Ukraine

1701

7.1 Mw

Vrancea

Nation-wide, reaching Poland (similar shocks to 1977)

Buildings collapse and damages in Brașov and Cluj

1604

6.8 Mw

Vrancea

Transylvania (Brașov, Alba Iulia, Sibiu)

Castle walls and towers collapsed in Sibiu; widespread damage in Transylvania regions

1571

6.5 Mw

Făgăraș-Câmpulung

Brașov, Sibiu (at least three smaller aftershocks)

Damage likely localized in central Romania

1471

7.15 Mw

Vrancea

Brașov, Odessa, Caffa, Bistrița, Turda (felt from Moldova to Crimea; so strong that mountains and valleys shook)

Widespread damage across Eastern Europe; Brașov nearly leveled

Box 1. Results of EU-wide exposure to seismic and other hazards

Exposure analysis across the EU shows that over 90 percent of emergency response assets in some areas have a 10 percent chance of experiencing strong seismic shaking in 50 years, with Romania facing over 60 percent of its assets at risk, including more than 1,000 educational facilities (Figure 2).[115]

[115] World Bank. 2024a. *Tools for Making Smart Investments in Prevention and Preparedness in Europe - From Data to Decisions. Economics for Disaster Prevention and Preparedness:* Link.

Figure 2. Concentrations of exposure to high seismic hazard in Romania: Health care facilities (left) and education facilities (right)

Source: World Bank 2024. Link.

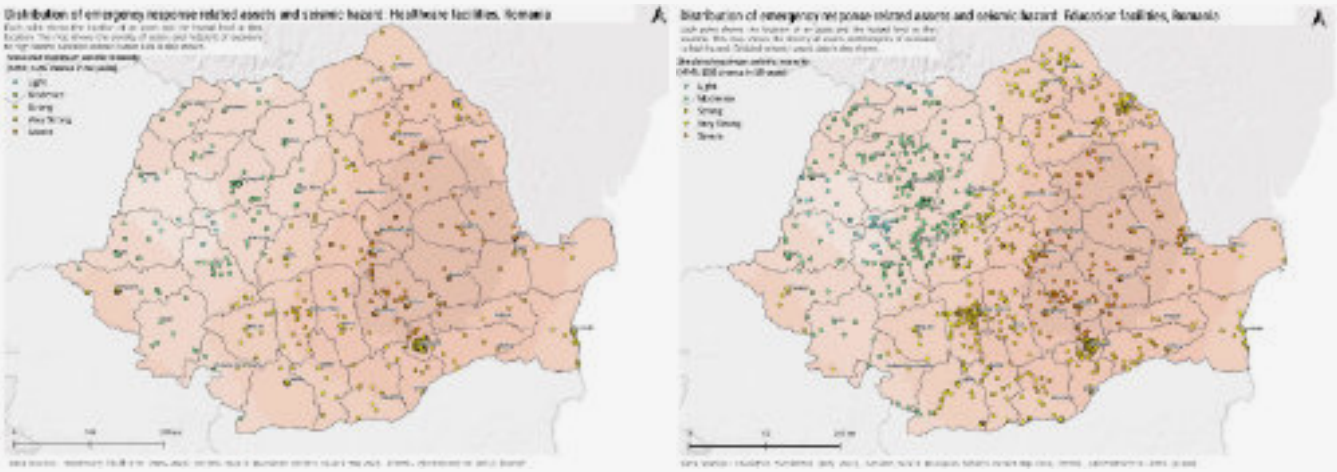
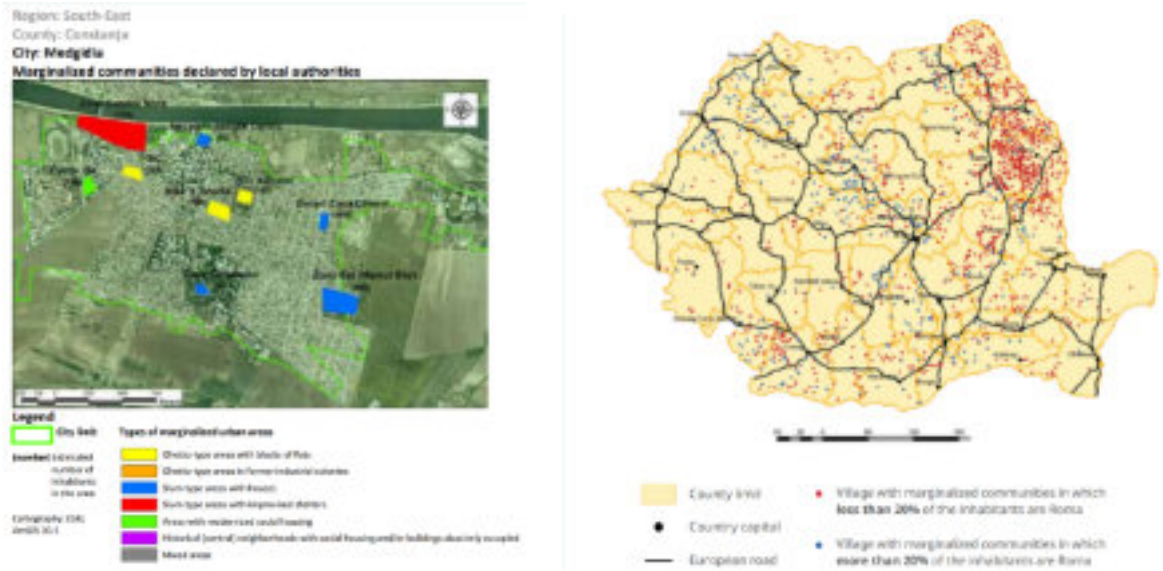


Figure 3. Distribution of rural versus urban marginalized communities across Romania

Source: Anton et al. 2014; Sandu et al. 2016.



EXPECTED FUTURE TRENDS

The 1977 earthquake is the most recent catastrophic seismic event that left a mark in the collective memory of Romania. The 7.2 magnitude earthquake caused 1,578 fatalities (90 percent of them in Bucharest), 11,321 injuries, and severe damage or collapse of 156,000 residential apartments, over 2,274 schools, and 459 hospitals. The World Bank assessed that damage costs and production losses reached US$2.05 billion (equivalent to over US$10 billion today or more than 6 percent of Romania's official exchange rate GDP at that time). Post-1977 evaluations revealed significant damage to buildings in the capital city of Bucharest (18,000 buildings) and Iași (2,000 buildings), with findings indicating that high-rise concrete buildings performed poorly in Bucharest while low-rise buildings were more affected in Iași. Many buildings were left unrepaired after the earthquake, while some others still remain highly vulnerable to similar future events, given that the interventions carried out only aimed at restoring their pre-earthquake condition without reducing their vulnerability.[36]

Today, a seismic event similar to the 1977 Vrancea earthquake could cause even greater damage due to aging infrastructure, urbanization, and socioeconomic factors—Romania ranks among the top five EU countries for earthquake and flood-related annual losses (AAL) of €512 million for earthquakes, with repair costs of public and private infrastructure (on top of emergency response) for a 1-in-50-year event potentially reaching €5 billion.[37] The NRA RO-RISK project identified earthquakes as Romania's highest-risk hazard, leading to the development of the National Post-Earthquake Response Concept. According to the concept, a Vrancea earthquake (magnitude 7.4–8.1) could severely affect 31 counties and Bucharest, damaging over 350,000 residential buildings and causing more than 45,000 serious injuries or fatalities nationwide, with Bucharest potentially experiencing severe damage to between 838 and 33,569 residential buildings.[38] Additionally, vulnerabilities, such as unauthorized building modifications, degradation, severe traffic congestion, aging emergency infrastructure (including hospitals), limited public preparedness, and low disaster insurance coverage, collectively worsen the potential impact of a future major earthquake.

[36] GoR 2022.
[37] World Bank and European Commission 2021b.
[38] MoIA (Ministry of Internal Affairs). 2021. *National Post-Earthquake Response Concept (Second Edition)*. Link.

EARTHQUAKE RISK MANAGEMENT AND INVESTMENT CAPACITIES

The following chapters provide an overview of key gaps and vulnerabilities in existing risk management practice relevant to Romania, along with examples of successful strategies, investments, and approaches. It draws on publicly available information (such as national risk assessments, government reports, and studies) as well as information gathered during consultations.

GOVERNANCE OF EARTHQUAKE RISK MANAGEMENT

This chapter focuses on seismic risk governance, with an emphasis on the legislative, institutional, strategic, and planning framework. The framework describes mandates, roles, and responsibilities as well as coordination arrangements among the different stakeholders, their policies, instruments, and investments.

DRM context

Romania's DRM framework is aligned with the global Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR). The National Disaster Risk Management Plan (NDRMP) 2020–2027 (PNMRD),[39] approved in 2021, focuses on five natural risks—earthquakes, floods, forest fires, epidemics/pandemics, and droughts—and promotes institutional reform and investment in line with international guidelines. The plan facilitates access to various EU funding for disaster and climate resilience. The National Recovery and Resilience Plan (NRRP),[40] approved in 2020, facilitates access to the EU's Recovery and Resilience Facility (RRF), supporting a transition to a sustainable green and digital economy, with reforms and investments, including in disaster and climate resilience reforms such as integrated flood risk management.

Romania's climate change framework is aligned with global and EU climate efforts on mitigation and adaptation.[41] The Integrated National Energy and Climate Plan (NECP) 2021–2030 sets targets for a clean energy transition, including a binding national target for reducing greenhouse gas (GHG) emissions that are not covered by the EU Emissions Trading System. Romania's National Energy Strategy 2020–2030 includes goals, measures, and funding lines linked to the NECP. In addition, Romania's Long-Term Renovation Strategy (LTRS), approved in 2020, aligned with EU energy efficiency goals, aims to achieve €12.8–18 billion in investment, with 39 percent expected from public funds and 61 percent from private and commercial sources. In 2024, the National Strategy for Climate Change Adaptation will support cross-sectoral strategic planning and coordination and operationalization of policies for adaptation.

DRM in Romania is governed by GD No. 557/2016,[42] comprising several areas, including prevention/risk reduction, preparedness, response, evaluation (investigation), and recovery and rehabilitation. National authorities are assigned primary or secondary roles in managing specific risks based on their competencies (such as Ministry of Development, Public Works, and Administration [MDPWA] for seismic risk or the Ministry of Environment, Water and Forests [MEWF] for floods), with primary authorities ensuring integrated coordination of all involved entities. Inter-institutional coordination and consistency of DRM and mitigation/adaptation efforts are also being fostered through the National Platform for Disaster Risk Reduction (NPDRR) set up in 2016 (GD No. 768/2016) consisting of key line ministries and agencies and the Inter-ministerial Committee on Climate Change (GD No. 563/2022), established in 2022. The platform provides a framework for all stakeholders—government, public administration, civil society, research institutes, and academia—to meet, discuss, and make decisions on risk management, community resilience, and unified solutions for risk reduction. At the local level, county and prefecture authorities have responsibilities across the DRM cycle. Externally, Romania has actively participated in the EU Civil Protection Mechanism, including projects such as RO-RISK-SIPOCA 30 for risk evaluation, and has developed certified intervention teams and advanced equipment through EU-funded projects.[43]

[39] NCES (National Committee for Emergency Situations). 2020. *National Disaster Risk Management Plan*. Link.
[40] NCES 2020.
[41] Including the European Green Deal and the EU's joint Nationally Determined Contribution (NDC).
[42] GD No. 557/2016 of August 3, 2016, regarding the management of risk types. Link.
[43] NCES 2020.

CURRENT ARRANGEMENTS

Strategic and legal earthquake risk management framework

Romania's legal framework for managing seismic risks encompasses a broad range of normative acts at both European[44] and national levels. In addition to Eurocodes, specific national codes and laws are in place. The P100-1/2013 Code and P100-3/2019 Code address seismic design and the assessment of existing buildings, respectively, aligning with Eurocode 8. P100-1/2013 includes zoning based on seismic hazard and categorizes buildings by their importance and risk, while P100-3/2019 focuses on evaluating and mitigating the seismic vulnerability of existing structures. The P100 part 1 (P100-1) currently under revision, which began in 2023 and is now in its final development phase, includes a key change related to seismic hazard (from a 225 MRI to a 475 MRI) aligned with Eurocode—increasing design earthquake loads, on average, by 15-20 percent. This change could increase construction costs and complicate the retrofitting of existing buildings, particularly those with cultural heritage value, as higher design loads mean more invasive interventions. The development of a specific analysis and retrofitting code for buildings with cultural heritage value should therefore be accelerated. The specific section of the P100 code that would cover cultural heritage buildings is P100 Part 8 (P100-8), but its development is significantly delayed, with difficulties establishing the acceptable level of risk versus the acceptable level of interventions for this type of buildings.

Additional national regulations include Law No. 426/2023 for the amendment and completion of Law No. 212/2022 regarding certain measures for reducing the seismic risk of buildings[45] which supports the National Program for the Strengthening of High-Risk Buildings, and Law No. 115/2023, for amending and supplementing Law No. 260/2008 regarding the mandatory insurance of homes against earthquakes, landslides, and floods, which mandates compulsory insurance for buildings against earthquakes and other natural hazards. Complementary ordinances and technical regulations, such as those governing emergency response and post-seismic building safety, further solidify the legal framework. These measures aim to ensure effective management and mitigation of seismic risks through comprehensive standards for building safety, emergency preparedness, and insurance. More information is provided in the next sections.

The national strategic approach to earthquake risk management is outlined in the 2022 NSRRS and its implementation plan. The NSRRS is implemented alongside other strategic documents such as the National Disaster Risk Reduction Strategy (NDRRS), the NDRMP, and the LTRS. The NSRRS prioritizes seismic risk for public and private buildings, including cultural heritage buildings, while other critical infrastructure for national or strategic purposes is addressed by the NDRRS. The NSRRS aims to create a greener, more earthquake-resilient, and inclusive built environment by 2050 through (1) reducing seismic risk through targeted investments, (2) improving the sustainability and functionality of buildings, (3) integrating seismic risk into planning and recovery processes, and (4) increasing public awareness and participation. Implementation will ensure the integration of energy efficiency with urban development and housing policies while also accounting for seismic and other hazards, leveraging cost-saving synergies for comprehensive solutions. Romania's LTRS outlines €12.8 billion in investment needs to enhance the energy efficiency of its building stock by 2030, with the NRRP designating €2.2 billion for this initiative. To monitor progress, MDPWA uses sector-specific working groups and strategic partnerships with technical institutions, the academic sector, the private sector, and civil society organizations (CSOs) to inform and adjust future planning. Also, all involved institutions are required to report on specific indicators to MDPWA, following a standardized data collection and reporting methodology, thus creating a generally well-coordinated approach to earthquake risk management.

Institutional earthquake risk management framework

The institutional framework for earthquake risk management depends on coordination among multiple agencies and organizations responsible for various functions; however, beyond emergency response, line ministries show limited awareness and commitment to risk reduction measures—such as maintaining the functionality of health, energy, and communications systems

[44] The Eurocodes, including Eurocode 8, provide essential standards for the design and assessment of earthquake-resistant structures, outlining methodologies for evaluating seismic risks, designing structures to withstand seismic forces, and assessing performance for both new and existing buildings.

[45] Law No. 212/2022 on certain measures for reducing the seismic risk of buildings ('the Law') repealed Government Ordinance No. 20/1994.

following an earthquake. MDPWA oversees the coordination and monitoring of actions and progress (per GD No. 557/2016). With support from MoIA and the General Inspectorate for Emergency Situations (GIES), MDPWA ensures that the implementation of the NSRRS aligns with broader national strategies and is primarily responsible for prevention and reconstruction/rehabilitation to restore normalcy, whereas MoIA focuses on response operations. Various line ministries act as key implementers, working alongside MDPWA, regional and local authorities, research institutes, and universities to synchronize efforts across different programs and strategies aimed at reducing seismic risk. Among these entities, the State Inspectorate for Construction (ISC) plays a key role in evaluating building safety and structural stability after seismic events and determines emergency measures for vulnerable structures.

At the subnational level, local authorities are central to seismic risk management through several laws and frameworks, from risk assessment and response to recovery, though challenges in coordination and capacity-building persist. Local authorities are responsible for conducting EVRs of buildings to reduce seismic risk (Law No. 212/2022 amended and supplemented by Law No. 426/2023), with a specific focus on public buildings such as schools and hospitals. They also oversee, manage, and update hazard and risk maps at the county level, which are then approved by MDPWA, and are responsible for ensuring that hazard maps are updated every 10 years. Civil protection legislation (Law No. 481/2004) assigns public authorities at both central and local levels the responsibility for risk identification, public awareness, emergency response, alerting citizens, and disaster mitigation. Additionally, under the National Emergency Management System (*Sistemul Naţional de Management al Situaţiilor de Urgenţă,* SNMSU), local authorities coordinate with county and national committees to manage emergency interventions, activating response mechanisms based on the severity of the situation.

Local authorities, coordinated with MoIA through GIES, manage population protection, evacuation, and recovery efforts during disasters, and assist with reconstruction. However, gaps in the GD No. 557 prevent clear role definition for local authorities, who are currently grouped under MDPWA (that is, public administration) instead of being recognized as distinct entities in recovery planning. Nonetheless, they are also involved in managing evacuation shelters and post-disaster recovery, as outlined in the Risk Analysis and Defense Plan (*Planul de Analiză și Acoperire a Riscurilor,* PAAR) 2019 for Bucharest. However, challenges remain, such as the need for updated regulations and improved coordination with volunteers, CSOs, and other stakeholders, as well as enhanced local capacities for disaster preparedness and response planning.

KEY OPPORTUNITIES

With respect to the earthquake governance framework, the following key opportunities have been identified: (1) improving risk data collection and incorporating it into land planning frameworks, (2) improving damage and loss assessment and developing a comprehensive recovery framework, (3) enhancing the engagement of CSOs and the private sector, (4) enhancing inter-institutional coordination and optimizing human resources capacity through reform and training at all levels; (5) ensuring sufficient allocation of resources through EU funds and other sources fostering an enabling environment that promotes private sector investment and public willingness to invest in renovations, moving away from the current dependence on grants.

Improving risk data collection and incorporating it into land planning frameworks

Romania has an opportunity to enhance its seismic risk assessment framework by creating a risk mapping methodology and standardizing risk mapping procedures. This standardized approach should be incorporated into Law No. 575, along with clear definitions to distinguish between hazard and risk. Moreover, the focus should fall on the development of missing P100 sections, such as the completion and approval of the P100-8 Seismic Evaluation and Retrofitting Code for cultural heritage buildings; the P100-1 Seismic Design Code, set to be implemented in 2025; and the development of a Seismic Microzoning Guide, with terms of reference being currently drafted for two pilot projects in Râmnicu Sărat and Bârlad selected due to their exposure to Vrancea seismic activity, with the aim of enhancing data collection through the integration of information from the seismic monitoring network and local stations to demonstrate the application of risk mapping and microzonation methodologies. Enforceable provisions for the integration of risk maps into planning processes should also be prioritized.

Improving damage and loss assessment and developing a comprehensive recovery framework

Developing a standardized methodology for collecting damage and loss data in Romania is needed, with GIES planning a future approach to quantify losses. This would also imply addressing the current lack of distinction in terminology between damage and losses. Romania has yet to develop a post-earthquake recovery framework. Although some fragmented information exists, such as current regulations from MDPWA outlining post-disaster responsibilities, there is an opportunity to create a comprehensive post-earthquake recovery framework and update GD No. 557 to clearly define the roles and responsibilities of entities in the recovery phase, listing local authorities (also referred to as public administration) as a distinct entity rather than being grouped under MDPWA.

Enhancing the engagement of CSOs and the private sector

Romania's current legislative framework on enhancing collaboration with voluntary services and the private sector in prevention, preparedness, response, and recovery presents ample opportunities to refine laws to involve CSOs, spontaneous volunteers, and private entities at all stages while addressing gaps in training, equipment provision, and themes such as gender equality, vulnerability, and discrimination across regional and local levels.

Enhancing inter-institutional coordination and optimizing HR capacity through reform and training at all levels

Romania should continue to reform its human resource strategies in disaster risk management related fields and establish capacity-building and career development opportunities at all levels, with a particular focus on technical expertise and local-level implementation. The current significant imbalance in government staffing, with more personnel assigned to hail management despite earthquakes posing a higher risk, for example, should be prioritized. Romania could conduct a comprehensive assessment to realign human resources according to actual hazard levels, to enhance disaster preparedness and response across all hazards ensuring appropriate staffing and capacity at all levels.

This could be achieved by developing a human resources strategy, especially within MDPWA which is responsible for national earthquake risk management. Well-funded, long-term workplace training plans are needed to ensure the proficiency and diversity of emergency management personnel at the national, county, and local levels. This can also help improve coordination in managing seismic risk, as well as communication and information sharing between central and local authorities. The human resource strategy at the MDPWA level should be aligned with a broader, cross-ministerial approach addressing all disaster risks. This would establish solutions to optimize staffing and technical capacity at all levels and, if needed, reallocate personnel or reassign positions currently assigned to lower-risk hazards—such as hail—according to the risk priorities outlined in the RO-Risk matrix.

Moreover, Romania's current seismic risk governance framework highlights the need for strengthening local capacities in understanding earthquake risk, prevention, preparedness, planning, and response. While there are collaborative structures at various governance levels, such as Emergency Situations Committees as part of the broader NCES system, there is an opportunity to improve local authorities' ability to develop their own seismic risk reduction strategies, response plans, and risk data maps. Enhancing local-level capacities will enable more effective risk management and ensure better coordination during emergencies. Developing and expanding training opportunities on risk data collection and reporting would build capacity and promote a sense of responsibility and agency among local actors by ensuring uniform data collection and reporting standards, enabling easier integration of local data into national and international systems, and improving overall coordination and response.

Ensuring continuous funds allocation for earthquake risk reduction

Romania has the opportunity to ensure sufficient funds allocation for earthquake risk reduction, clarify mandates and ensure budget while fostering an enabling environment that promotes private sector investment and public willingness to invest in renovations. There is a need to ensure the legal framework and budget for Local Governments to allocate funds for auxiliary activities and items within the National Retrofitting Program (such as notices, community discussions, technical assistance, price adjustments, etc.). Additionally, progress on key priorities outlined in the seismic

strategy could be scaled up by facilitating the operationalizing mechanisms for tracking and monitoring the execution of the strategy.[46] While some are in place as noted above, more efforts and resources are needed. Bucharest City Hall, for example, could improve its use of the existing national risk reduction program and improve communication with MDPWA as the main counterpart in the seismic risk-reduction process. The city and MDPWA could collaborate in data and information sharing, communication, results and indicators reporting, and drafting of new programs and together ensure that seismic risk reduction is an eligible activity across various programs being planned under the national budget or with the use of EU cohesion/structural funds.[47]

[46] GoR 2024.

[47] World Bank. 2021c. *Reimbursable Advisory Services Agreement on the Bucharest Urban Development Program (P169577), Component 4: Bucharest's Seismic Risk Reduction Program, Output 15: Recommendations for a City Strategy and Enhanced Public Awareness for Seismic Risk Reduction*. Link.

UNDERSTANDING EARTHQUAKE RISK AND USE OF RISK DATA

This chapter focuses on the current understanding of earthquake risks in Romania, which is informed by various sources of data and analysis, research and innovation, NRAs, and other risk evaluations. Earthquake risk is understood as the combination of seismic hazard (for example, the frequency of earthquake occurrence, the strength of ground shaking given an earthquake), exposure (for example, the number of people exposed, the value of assets exposed), and vulnerability (for example, the susceptibility of assets to damage, the ability of populations to cope with earthquake effects).

DRM CONTEXT

Disaster risk assessments are supported by central authorities, research institutions, specialized working groups, and contributions through projects. The national RO-RISK project (2016–2018), coordinated by GIES, established a national framework for risk assessment, including a standardized methodology reflecting EU standards and best practices and a WebGIS platform for sharing results. The first comprehensive NRA identified 10 key hazards from the 24 key risk scenarios with destructive potential outlined in GD No. 557/2016, resulting in hazard maps at the national level, a risk matrix, and the creation of the inter-institutional Working Group on NRA within the NPDRR. From 2019 to 2023, improvements were made, including (1) developing a methodology for assessing disaster-related damage to ensure standardization and comparability of historical data, (2) updating risk assessments to account for climate change and migration, (3) creating a national disaster damage database to collect and share relevant data in a standard format accessible to all stakeholders, (4) refining flood risk mapping, and (5) devising a method for rapid visual assessment (*Evaluare Vizuală Rapidă*, EVR) of seismic vulnerability in buildings. These efforts aim to enhance decision-making and disaster risk reduction (DRR) across all administrative levels.

CURRENT ARRANGEMENTS

National risk assessment: RO-RISK 2018

Seismic risk data in Romania currently rely heavily on the RO-RISK project and vary across public sectors, only covering certain buildings and including limited information, which makes them inadequate for civil protection and spatial planning. Seismic hazard maps were provided under RO-RISK at the administrative territorial unit (ATU) level, and for Bucharest, data is accessible to users in PDF format at the building level, including limited information, such as construction date, building type, year of assessment, and vulnerability class, focusing solely on buildings deemed at the highest risk. Additionally, the data used for the RO-RISK project are primarily based on the 2011 census and serve as the primary source for understanding the seismic exposure of the residential sector.

While the data cover a significant portion of the housing stock, data for other critical sectors such as education, health care, and cultural heritage buildings are less comprehensive. For these sectors, information is fragmented and less detailed, reflecting a gap in the overall seismic risk assessment framework, with a need for more granular, uniformly formatted, and up-to-date data on risk-exposed elements. In addition, as of August 25, 2024, a little over half of the approximately 40 million properties (58.12 percent) in Romania are digitally registered and managed by the integrated cadastral and land registry system.[48] Efforts are under way to develop and refine data systems like SIPCI to better manage and evaluate the seismic risk of cultural heritage structures. It is noted that Romania currently lacks dedicated efforts for seismic assessments and retrofitting of critical infrastructure like bridges, dams, tunnels, and pipelines. These structures are designed following the Eurocodes or by adapting general building design codes rather than having specific seismic design standards for them (such as P100-2).

[48] National Agency for Cadastre and Land Registration (NACLR). 2024. *Properties Managed by the Integrated Cadastral and Land Registry System.* Link.

Seismic hazard maps versus risk maps

In Romania, hazard maps are set to be updated every 10 years at the county level, but there is a lack of risk maps that incorporate exposure and vulnerability data at the local level, which requires additional effort. While the current hazard maps are based on a 1,000-year return period, a 200-year return period would be more suitable for earthquakes, requiring updated research since the 2011 census data is no longer reliable. According to Order No. 132/2007, local authorities must develop PAARs based on territorial risk schemes provided by the emergency situations inspectorates at county level, potentially including maps identifying Local authorities are expected to maintain hazard and risk maps for their territories. However, many local authorities lack comprehensive, up-to-date hazard and risk maps for their administrative areas, with some cities not having them at all. Many PAARs available on local authorities websites are outdated, and the methodology for developing PAARs does not require hazard or risk maps. Furthermore, how climate impacts are integrated into local emergency plans remains to be assessed.[49] Current legislation in Romania does not clearly distinguish between hazard and risk maps (Law No. 575/2001), leading to confusion, while county-level seismic hazard maps mainly replicate the national map without further refinement or additional localized data.

A new program by MDPWA for 2024–2027 aims to develop and update natural hazard maps for earthquakes and landslides, with a budget of €1,770,000 (RON 8,850,000) (per GD No. 6/2024). This initiative aims to identify vulnerable areas, enabling local authorities to implement targeted risk mitigation measures and establish strategic land use plans. Funding can cover up to 50 percent of costs from the state budget, fostering collaboration between local and national authorities.[50] However, there is a need for developing risk maps, but local authorities face challenges in their development due to insufficient training in drafting terms of reference and a lack of a standardized methodology, resulting in hesitancy from specialists to validate these maps due to the absence of a risk-specific quality control process.

Secondary hazard maps

In Romania, secondary hazards like landslides and dam collapses are recognized as key risks, with some efforts made to create landslide hazard maps at the county level (funded under GD No. 932/2007). However, these maps primarily focus on landslides triggered by heavy rainfall, not by earthquakes, and do not account for combined effects. Earthquake-induced fires are also a challenge to model and assess effectively, making it difficult to integrate such hazards into risk frameworks. The identification of earthquake-related secondary hazards like landslides and dam failures remains critical, though existing tools and assessments could be expanded to address combined risks more comprehensively.

Microzonation

Microzonation in Romania is still to be implemented, necessitating increased resource allocation and a focus on collecting specific local data to improve seismic risk assessments and planning. Currently, the seismic hazard maps at the county level mainly replicate detailed versions of the national map without additional data or refinement, limiting their usefulness for localized risk assessments. Recently, two pilot projects were planned to apply risk mapping methodologies in Romania, focusing on better understanding soil conditions and their impact on seismic risk. Râmnicu Sărat and Bârlad were selected due to their exposure to Vrancea seismic activity, with the aim of enhancing data collection through the integration of information from the seismic monitoring network and local stations. However, the program suffers from limited funding.

Pre-earthquake data collection: Rapid Visual Evaluation (EVR)

Pre-earthquake data collection in Romania uses methods like rapid visual evaluation (EVR) based on the RTC 10-2022 Methodology,[51] supported by the EVR platform, part of the NSRRS. The EVR platform, managed by the MDPWA, is a digital system that supports collecting and assessing seismic vulnerability and exposure data, prioritize building investments, and catalogue representative building types. The data collection is conducted by civil engineering students and specialists, focusing on public buildings. Private buildings are evaluated if they impact emergency responses. Hospital data should have been included by the 1st of November 2024, but the Ministry of Health (MoH) is yet to provide the necessary information. Currently, despite extensive efforts by the MDPWA—including circulars sent via the Prefect's Office and four dedicated seminars to explain legal obligations and guide UAT representatives in using the platform (public administration representatives, mayors etc.)—feedback has been limited, suggesting a need for continued support and clearer communication to strengthen understanding and engagement at the local level.

[49] GoR 2024.

[50] MoEF (Ministry of European Funds). 2024. *The Program Regarding the Financing of the Development and/or Updating from the State Budget of Natural Risk Maps for Earthquakes and Landslides for the Period 2024–2027*. Link.

[51] MDPWA. 2023. *Rapid Visual Assessment Methodology for Buildings, Indicative RTC 10 - 2022*. Link.

The Municipal Administration for Retrofitting of Seismic Risk Buildings (AMCCRS) list,[52] representing the only publicly available data on vulnerable buildings in Bucharest, does not capture the full extent of seismic vulnerability. The current list of buildings assessed for seismic risk does not include details on ownership status and building function, which could aid in prioritizing retrofitting efforts. Out of the total residential buildings in the city, the 2,495 residential buildings and 26,985 housing units listed represent only about 2 percent, leaving many potentially vulnerable structures unlisted.[53] Additionally, it does not yet mention certain vulnerable buildings, such as high-rise apartments built between 1950 and 1978, a period when seismic design codes were inadequate. These buildings may be particularly vulnerable, but their standardized designs could offer scalable and efficient solutions for seismic risk reduction, especially for publicly owned structures.

In 2024, Bucharest's AMCCRS launched a pilot seismic assessment of 275 buildings, filled 47 EVR forms and is now planning to expand it to 20,000, backed by a €500,000 grant from the Council of Europe Development Bank. This pilot project was initiated following MDPWA Order No. 3.231/2022, and all RVA forms were uploaded to the Ministry's platform, while the remaining buildings were ineligible under Law No. 212/2022 amended and supplemented by Law No. 426/2023. AMCCRS is now running a public procurement procedure to extend the assessment process, aiming to complete 20,000 EVR forms—mainly for protected and historic buildings. The project is co-financed by a €500,000 grant from the Council of Europe Development Bank, but more funding shall be needed, with an estimated cost of €300/EVR form. Once the pilot project is implemented and the necessary technical insights are gained, it will be scaled and expanded across Bucharest through a framework agreement, with the goal of fulfilling legal responsibilities by 2025.

Access and use of data

Other challenges include limited access, collection, and lack of continuous exchange and operational use of risk data between stakeholders, as well as a lack of specialized experts in seismic risk assessment. Romania currently faces a shortage of certified technical experts in critical fields such as energy efficiency, structural engineering, and heritage preservation. The certification exams reflect a significant gap in both training and experience, with only about 30 percent of candidates passing. Furthermore, there is a notable lack of qualified technical experts in seismic risk reduction, with many younger professionals lacking experience and mid-career experts demonstrating low commitment, posing a challenge to addressing seismic and other disaster risks effectively.

KEY OPPORTUNITIES

Regarding risk assessment, the following three key opportunities have been identified: (1) updating legislation and methodology for developing hazard and risk maps and PAARs and (2) expanding the scope of risk assessment to include heritage structures and critical infrastructure as well as to consider secondary hazards.

Concentrating more narrowly on data collection processes and improving information use and flow between stakeholders, the following two key opportunities have been proposed: (1) establishing systems and mechanisms between sectors to exchange information, consolidate data, regularly update risk assessments, and create a more comprehensive seismic risk profile and (2) providing resources and training necessary at the central and local levels for efficient data collection and improved seismic risk reduction/DRR knowledge.

Update legislation and methodology for developing hazard and risk maps and PAARs

An opportunity exists to strengthen Romania's risk mapping system, including seismic, by developing a unified methodology and a platform to centralize risk maps and integrate them into planning processes. A new NRA should ensure that past efforts are acknowledged and reflected in updated seismic microzonation maps, while the earthquake hazard mapping could be improved by adopting a more suitable (e.g. 200-year) return period, supported by updated research to replace outdated 2011 census data. Additionally, a geotechnical drilling campaign could be prioritized and fund allocated to understand the dynamic characteristics currently missing and needed for effective microzonation. This process could be complemented and accelerated by

[52] MARBSR (Municipal Administration for the Reinforcement of Buildings with Seismic Risk). 2024. "List of Buildings [Updated List of Buildings]." Link.

[53] Ana Elian. 2023. "What We Currently Know About the Vulnerability of Residential Buildings in Bucharest and Across the Country." Acasa în Siguranță. Link.

Figure 4. NSRRS: Role of the visual assessment in the prioritization of investments

Source: NRRS.

<table>
<tr><td colspan="3">National Seismic Risk Reduction Strategy (MLPDA)</td></tr>
<tr><td rowspan="2">LEVEL 1</td><td rowspan="2">National Probabilistic seismic risk assessments</td><td>Program allocation and design
Allocation of funds across multiple programs informed by risk data (for both public and residential buildings)</td></tr>
<tr><td>Regional allocation of investment
Allocation of funds across cities/towns/communes informed by risk data</td></tr>
<tr><td colspan="3">Implementation of Investment Program (by Cities, Towns, Communes, Line Ministries and other stakeholders)</td></tr>
<tr><td>LEVEL 2</td><td>Visual seismic assessments to collect building data and identify the vulnerability of existing building types</td><td>Prioritization of interventions
Information from visual seismic assessments is used to prioritize and rank existing assets based on risk</td></tr>
<tr><td>LEVEL 3</td><td>Detailed seismic evaluations, including feasibility studies and detailed designs</td><td>Execution of interventions
Retrofitting or construction works are implemented in prioritized assets</td></tr>
</table>

creating a centralized database of geotechnical information. For example, private companies could be required to submit borehole data for depths greater than 10 meters, following best practices such as those implemented in France. Romania could also prioritize regular revisions and updates to Law No. 575/2001 based on the latest risk assessments, thus clarifying the terminology between hazard and risk and amending the law accordingly, which would further help ensure consistency and improve local authorities' capacity to draft and validate risk maps. Additionally, the methodology for developing PAARs should be revised to incorporate hazard and risk maps, and efforts should be made to ensure that climate impacts are properly integrated into local emergency plans. Furthermore, an NRA registry could be developed to integrate upcoming risk maps from the NRA, which will ultimately support a more seamless integration into planning processes through platforms like the National Observatory and INSPIRE, which include risk layers. Lastly, the draft law for the Territorial Planning, Urbanism, and Construction Code could streamline and consolidate regulations into a single, coherent framework, covering related fields like environment, energy, transportation, property, and risk management.

Expanding the scope of risk assessment

Romania has the opportunity to enhance seismic resilience by expanding risk assessments to include heritage structures and critical infrastructure as well as to consider secondary hazards. Although the seismic risk assessment within RO-RISK has primarily focused on the residential sector, there is a need to extend efforts toward public buildings and heritage structures through the development of specialized systems to improve data accuracy and sector-specific risk assessment. Moreover, assessing and retrofitting critical infrastructure such as bridges, dams, tunnels, and pipelines should be supported by the development of a tailored national seismic assessment and design and evaluation code for these structures. Additionally, addressing secondary hazards like earthquake-induced landslides and dam failures through comprehensive risk assessments and tools that account for combined effects can significantly improve seismic risk management.

Improving information use and flow

There is also potential for establishing multiple systems and mechanisms between sectors to exchange information, consolidate data, regularly risk assessments, and create a more comprehensive seismic risk profile. Funding should be ensured and resources allocated for establishing data collection protocols across institutions, combined with leveraging sources like the National Buildings Registry, the Territorial Observatory, and publicly available data from the National Institute of Statistics, which can improve data consistency, transparency, and the effectiveness of seismic risk reduction efforts.

Providing resources and training

Finally, to address personnel challenges in seismic data collection, there is scope to allocate resources, secure funding, provide staff training, reform expert certification systems, and embrace innovative methods. Investments in training and guidance for public administration at all levels to improve seismic risk reduction/DRR knowledge, including a training mechanism for disaster damage and loss assessment, with periodic exercises are also needed to enhance technical capacity for data collection, management, and analysis. Romania has an opportunity to address its shortage of certified technical experts by reforming the certification system—given that only around 30 percent of candidates currently pass—thus improving qualifications, training, and professionalism, ensuring better preparedness for tackling seismic and other disaster risks. Moreover, providing training in drafting terms of reference for hazard and risk maps, alongside implementing a specific risk-related quality control process, would enhance local authorities' capacity to effectively assess seismic risk and ensure the validation and approval of these maps by specialists. Leveraging ideas like engaging diverse actors to populate databases, as seen in the EVR platform where Technical University of Civil Engineering of Bucharest (*Universitatea Tehnică de Construcții București*, UTCB) students catalog data using EVR, can enhance coverage, though full assessments still rely on trained inspectors or students with relevant academic backgrounds.

EARTHQUAKE RISK PREVENTION, REDUCTION, AND MITIGATION

This chapter focuses on earthquake risk prevention, reduction, and mitigation, outlining opportunities regarding legislative reforms, development and enforcement of building codes, and enhancing current retrofitting programs for public and residential buildings. It also addresses the integration of hazard considerations into planning documents and sectoral strategies as well as the scaling up of retrofitting efforts in critical sectors. The chapter recognizes that the concept of risk prevention varies through Romanian strategic documents and would benefit from a unified understanding and definition.

In line with the governance framework, planning and prevention activities fall under the scope of MoIA and relevant line ministries (depending on the hazard) as well as the subnational level. In 2024, the NDRRS 2024—2035[54] was approved, covering all hazards identified by the NRA and providing a comprehensive strategic framework for enhancing Romania's disaster resilience. It promotes a whole-of-society approach through multisectoral, multi-hazard, participatory, and inclusive efforts. Related to flood risk management, Romania's Flood Risk Management Plans (FRMPs), with the most recent cycle approved in 2024, are the main instrument required under the EU Floods Directive. These plans include major investments for rehabilitation and retrofitting worth €3.8 billion prioritized in FRMPs, €1.05 billion for climate-related measures in the Updated National Basin Management Plan, and €235.3 million for dams and €105 million for 510 km of dike lines under the NRRP. The NSRRS 2022 promotes an integrated approach to seismic risk reduction and green building transitions, aligning investments with the LTRS priorities and incorporating energy-efficient renovations where feasible, proposing a total of €13.6 billion to retrofit and improve the energy efficiency of buildings by 2030. Additional information will be presented in the subsequent sections.

Funds for DRM[55] are sourced mainly from the state budget, local budgets, and internal funds from public and private contributions, insurance, and complemented through the EU or other international funding. So far, Romania has used these funds for DRM in four main areas: developing policies and strategies, increasing public awareness, training operational personnel, and strengthening intervention capacity.[56] A complete overview of existing public and private, national and international funding opportunities and synergies is not available; however, it is estimated that between 2014 and 2021, Romania invested over RON 73 billion (€15 billion) in DRM through national programs funded by the state budget, alongside approximately RON 7.3 billion (€1.5 billion) from EU investments.[57] Other sources of funds accessed for DRM include the Norwegian Mechanism 2014–2020 and World Bank loans.[58]

CURRENT ARRANGEMENTS

Legislative updates

While Law No. 426/2023 has introduced a range of important updated relevant for seismic risk reduction, challenges persist—including unaffordable retrofitting for vulnerable groups, limited financial support instruments and continued double standards allowing occupancy of high-risk public buildings—leaving many citizens and public servants exposed to serious risk. Amending and supplementing Law No. 212/2022, the 2023 new law provides investment opportunities for seismic rehabilitation of high-risk buildings (including the red dot/stamp[59] buildings); restricts the use of vulnerable residential

[54] GoR (Government of Romania). 2024. *National Strategy for Disaster Risk Reduction 2024–2035*. Link.

[55] The following legislative framework governs disaster risk financing in Romania: Law No. 500/2002, Law No. 273/2006, GD No. 932/2007.

[56] NCES 2020.

[57] GoR 2024. Since 2002, Romania has invested around €1.5 billion in DRM from various EU funds, including, among others, Structural Investment Funds, Next Generation EU, the Recovery and Resilience Facility and UCPM. These funds supported various initiatives, including the development of EWSs, risk knowledge enhancement (RO-RISK), improved monitoring and forecasting capabilities, and better alert dissemination techniques (RO-ALERT).

[58] NCES 2020, 90.

[59] Red dot/stamp buildings, designated as SR I, are highly vulnerable to collapse in a major earthquake, with 356 such buildings listed. Most of these were assessed in the 1990s, and efforts to engage owners in retrofitting have been slow, hindered by outdated notification methods and legal loopholes. These gaps allowed property rentals and events in red dot/stamp buildings, reducing owners' urgency to retrofit and compromising public safety. World Bank 2021c.

structures; and supports retrofitting with government-funded technical expertise, risk assessments, energy audits, and post-intervention performance certificates. The eligibility criteria have been expanded, allowing all public interest buildings—regardless of ownership—to qualify for intervention works,[60] while residential buildings no longer need to meet the minimum height of P+3 and 10 apartments to qualify.[61]

A new provision under the new law allows homeowners' associations or individual owners to apply for state-guaranteed loans for seismic rehabilitation. In this case, the state covers interest costs through the Ministry of Finance's designated institution, with eligibility restricted to buildings in seismic risk classes I (SRI) and II (SRII). However, this measure has low effectiveness given limited bank involvement in the drafting process of the law and the absence of practical financial support mechanisms. Moreover, the new law also enhances safety by prohibiting apartment rentals and large gatherings in vulnerable structures while introducing government-funded coverage for technical expertise, seismic risk classification, intervention assessments, energy audits, and post-intervention energy performance certificates, fostering proactive retrofitting and effective risk management. However, the same usage restrictions do not yet apply to public buildings classified as high seismic risk (SRI and SRII), meaning they can still be occupied despite the serious safety risks—exposing public servants and citizens to potential harm during an earthquake.

Seismic building codes

The seismic vulnerability of buildings in Romania is significantly influenced by the building codes in place at the time of their construction, which, although periodically updated, still require further enhancements to address current risks and challenges effectively. Seismic design codes in Romania began with P13-63 in 1963 and have evolved through several updates, incorporating lessons from accelerographic data since 1977 to improve building safety. However, buildings constructed before 1978 under less stringent codes remain particularly vulnerable, especially compared to those adhering to modern seismic standards.[62] Currently, the seismic design of buildings follows the technical regulation P100-1/2013 (updated in 2019), which aims to protect life, maintain essential services, and minimize material damage during earthquakes. MDPWA is preparing an update to the P100-1 seismic design norm, which defines seismic hazard levels for new constructions and retrofitting projects. However, this update has sparked debate within the Tprofessional community, as some designers worry the new standards might become overly restrictive if seismic hazard levels are increased. The NDRRS includes plans to update other sections of the seismic design code in line with Eurocode 8, with the involvement of all relevant stakeholders.

Land use planning: the National Building Registry

Currently, the territorial planning system does not systematically address seismic risk reduction objectives. This lack of integration means that seismic risk is not adequately considered in territorial planning documents and development strategies at the local, county, regional, and national levels. Initiatives are under way at MDPWA to create the necessary tools for central public administration authorities responsible for approving documentation and especially for local public administration authorities managing and implementing territorial and urban planning documentation, including in GIS systems. These efforts aim to enhance community development and implement public investments using territorial planning instruments while addressing climate change and uncontrolled urban expansion.

In Romania's NRRP, funding has been allocated for the digitalization and development of tools and databases in construction, territorial planning, and urbanism. Under Component 10 (Local Fund), 298 territorial and urban planning documents will be prepared, and under Component 5 (Renovation Wave), a National Digital Building Registry which in its pilot phase will focus on buildings renovated through the NRRP. However, the National Building Registry, a critical tool for the MDPWA, initially planned for online release on the public utility information system with its pilot section by December 21, 2024, is currently stalled due to fiscal situation, which inhibits the integration with cadastral and other national databases.

Seismic risk reduction programs

Given the lack of updated, structured data on the built environment, the NSRRS proposes a strategic investment planning methodology based on a tiered, three-level evaluation approach that prioritizes buildings based on seismic risk and potential benefits from risk reduction actions. As

[60] Provided they are classified as SR I or SR II and have a peak ground acceleration (PGA) value of ≥0.15g, lowered from ≥0.20g.

[61] As long as their PGA is also ≥0.15 g.

[62] Buildings are categorized based on the code period—Pre-Code (before 1963), Lower-Code (1963-1977), Moderate-Code (1978-1992), and Superior-Code (post-1992)—with older codes indicating higher vulnerability.

noted in the section on understanding risk, the approach involves a national-level assessment of the existing building stock for various sectors (for example, residential, educational, health care) to understand its vulnerability, classify risks, identify high-risk buildings, and perform detailed technical evaluations only for those identified as high-risk, with stricter performance criteria for those critical to public safety and emergency response. This optimizes fund allocation and ensures that seismic risk assessments are used to inform investment decisions that yield the maximum protection and financial efficiency. Multiannual programs for both public and private buildings, funded by public, private, and European or external sources, are included in the strategy. The strategy also follows the build back better (BBB) principle, proposing the demolition and replacement of seismically vulnerable buildings without historical or architectural value.[63]

MDPWA finances sectoral investment programs to allocate state funds for the consolidation and assessment of vulnerable buildings, while county and prefecture authorities are responsible for prevention and management at the local level. The National Program for the Consolidation of Seismic Risk Buildings, established under Law No. 212/2022, which was subsequently amended and supplemented by Law No. 426/2023, includes a Subprogram for Residential Buildings and one for Public Interest Buildings. Through this program, non-repayable state funding is provided, including non-residential spaces under a state aid scheme. These investments serve as models for further modernization and investments through national or EU funds (see Table 2).

However, retrofitting works have been delayed due to unresolved legal issues around relocation, limited implementation capacity at the sectoral level, and a lack of clear communication about retrofitting costs, which has led to confusion and diminished public trust in AMCCRS. Although the program is publicly promoted as fully free, in practice it requires homeowner co-financing ranging from 10 – 20 percent (up to €30,000), with the remainder supported by the NRRP which is financing €700/m² including VAT, . The General Council of Bucharest may charge an extra €500–€600/m² for construction and installation, further increasing out-of-pocket costs for homeowners. In many cases, the retrofit cost is higher than the apartment's market value, making it financially unviable for owners—especially for vulnerable groups like the elderly, who often cannot afford it. Moreover, **t**o access the program for residential buildings, a majority (50 percent + 1) decision by the homeowners' association is now sufficient, resolving previous issues related to the requirement for unanimous consent, but since it does not allow forced eviction, relocation remains a challenge—authorities must still go to court to remove residents who refuse to leave so that work can begin. Finally, despite clear legal responsibilities under the new law, sector municipalities have not carried out their mandates regarding retrofitting efforts, leaving the task to the overstretched Municipality of Bucharest through AMCCRS.

Residential buildings

Despite recent efforts, progress in enhancing seismic resilience in Bucharest could be further scaled up. As of April 2025, six of the 849 buildings classified as high seismic risk have ongoing work**.** Despite clear responsibilities under Law No. 212/2022, which was subsequently amended and supplemented by Law No. 426/2023, and repeated notifications from AMCCRS since 2022, sector municipalities have not engaged in rapid seismic risk assessments, leaving the burden to the Municipality of Bucharest—the only one with a dedicated structure—while sector city halls rely on overstretched departments, stalling 71 approved projects (61 locally funded) and risking the expiration of technical assessments. Additionally, as noted above, public communication has led to misunderstandings by implying that seismic retrofitting under the NRRP is entirely free of charge, whereas in practice, property owners may be required to contribute a co-financing share of 10–20 percent (up to €30,000), which has negatively impacted public trust in AMCCRS, currently implementing the residential retrofitting subprogram.

Public interest buildings

The Subprogram for Public Interest Buildings targets public interest structures, focusing on improving seismic safety and energy efficiency in public buildings, including schools and hospitals. The Safe and Healthy Schools Program proposes a list of 214 schools in 2025, focusing on seismic consolidation, rehabilitation, modernization, and energy efficiency, with funding from MDPWA and

[63] The value of buildings with cultural heritage significance must be quantified and incorporated into analyses, requiring a political decision to assess various sites in Bucharest, as demolition is not an option, thus necessitating careful planning to minimize the impact of interventions.

execution by local authorities.[64] Other projects include the Consolidation of Hospitals Program 'Mihail Cantacuzino' includes intervention works at 35 hospitals in 2024 with confirmed hospitals such as Caransebeș Municipal Emergency Hospital, the only one in the Banat region, Dr. Pompei Samarian County Emergency Hospital in Călărași, and Bălcescu Hospital in Pitești which is renovating Building C at their diagnostic and treatment center; and the National Program for the Assessment of Public Buildings with Seismic Risk in the Health and Education Systems[65], financing technical assessments to classify seismic risk and develop intervention measures for 4,800 buildings in the health and education system by 2027.

[64] The National Investment Program "Safe and Healthy Schools". MDPWA. Link.
[65] GoR 2024.

Table 2. An Overview of Key Programs/Plans for Earthquake Risk Reduction in Romania

Source: Authors based on available information.

Area	Project Name	Measures	Actor	Estimated Budget	Period
National Program for the Seismic Strengthening of Buildings with High Seismic Risk in Romania					
Public Interest Buildings (Health and education)	**The Safe and Healthy Schools Program** (EO No. 7/2023)	Contributes to safer, more functional pre-university education buildings in Romania through seismic consolidation, rehabilitation, modernization, and energy efficiency works, including related facilities and possible partial demolitions. It targets intervention works at 214 schools in 2025.	MDWPA	Commitmentcredits: **€16 million** Budget credits: **€4 million**	2023-2027 (multi-annual)
	Consolidation of Hospitals Program 'Mihail Cantacuzino' (EO No. 49/2023)	Funds seismic consolidation, rehabilitation, modernization, and reconstruction of public health buildings are assessed by certified experts, with eligible beneficiaries including local authorities and public health institutions that are currently not fully financed by the state. It includes intervention works at 35 hospitals in 2024.	MDWPA, MoH	Commitment credits: **€40 million** Budget credits: **€4 million**	
	National Program for the Assessment of Public Buildings with Seismic Risk in the Health and Education Systems (EO No. 49/2023)	Finances technical assessment services to classify buildings by seismic risk and to support the development of intervention measures for structures in the health and education systems, with a target of 4.800 buildings by 2027.	MDPWA	Commitment credits: **€8 million** Budget credits: **€4 million**	
Residential Buildings	**Subprogram for the Design and Execution of Intervention Works for Residential Buildings**	From 2024-2027, funding will cover seismic consolidation and energy improvements for 73 multifamily residential buildings and 100 public buildings, averaging 900 sqm each.	MDPWA	approx. **€800 million**	

Area	Project Name	Measures	Actor	Estimated Budget	Period
World Bank's Portfolio of Investment Projects in Critical Infrastructure/Services in Romania					
Critical emergency infrastructure	**Strengthening Disaster Risk Management Project (P166302)**	Prioritizes up to 28 high-risk disaster and emergency response facilities, including fire stations, for seismic upgrades and energy efficiency enhancements.	MoIA, DES and GIES	**€142 million**	2018-2027
	Improving Resilience and Response Management Project (P168119)	Focuses on enhancing the resilience of 7 facilities of the Romanian Police that are critical for emergency response, improving energy efficiency and providing universal access, while also ensuring operational readiness for rescue personnel, with enhanced training and access to vital equipment.	MoIA, General Inspectorate of Romanian Police	**€50 million**	2019-2026
	Strengthening Preparedness and Critical Emergency Infrastructure Project (P168120)	Focuses on enhancing the resilience of 7 facilities of the Romanian Gendarmerie that are critical for emergency response, improving energy efficiency and providing universal access, while also ensuring operational readiness for rescue personnel, with enhanced training and access to vital equipment.	MoIA, General Inspectorate of the Romanian Gendarmerie	**€40 million**	2019-2026
Educational infrastructure	**Romania Safer, Inclusive, and Sustainable Schools Project (P175308)**	Approximately 10 primary and lower secondary schools in high seismic areas are being reconstructed, with a focus on safety, sustainability, accessibility, earthquake resistance, fire safety, energy efficiency, and climate resilience, and 12 other schools have been assessed and have technical designs prepared. Out of these 22 schools, 18 of them were provided with mobile classrooms to temporarily move children to safe learning spaces. The project will benefit students, including those with disabilities and from marginalized communities, by strengthening institutional capacity and providing model school designs, training, and streamlined project preparation documents for nationwide impact.	MDPWA	**€100 million**	2021-2027

KEY OPPORTUNITIES

Regarding the improvement of seismic prevention efforts in Romania with a focus on mitigation measures, the following three key opportunities emerged: (1) enhancing legislative effectiveness and introducing additional risk mitigation measures, (2) reforming building codes to match international standards and creating new sector-specific regulations, and (3) reforming land use planning to incorporate hazards considerations.

Retrofitting programs could be enhanced through the following two key measures: (1) scaling up retrofitting efforts in critical sectors and (2) building trust through prevention activities and awareness campaigns.

Expanding risk mitigation measures and enhancing legislative effectiveness

There is scope for expanding risk mitigation measures in several ways. This could be done, for example, by offering guarantees, subsidies; fostering public-private partnerships (PPPs) to support seismic retrofitting; expanding the administrative capacity of AMCCRS; and enforcing clear mandates for sector municipalities, supported by technical assistance and dedicated funding streams, to accelerate seismic assessments and ensure continuity of approved projects. This could be ensured by creating specialized seismic risk units/departments within sector municipalities using AMCCRS as an example, with targeted funding and capacity-building, to ensure efficient use of available resources and reduce pressure on general departments.

There is also a need for prioritizing the amendment of national regulations to streamline the prohibition of occupancy of all buildings. This could include public and private buildings, under certain conditions, classified as high seismic risk (SRI and SRII) until structural safety measures are implemented, ensuring consistent protection of life and safety regardless of ownership. Additionally, the government should ensure transparent public communication through awareness campaigns (especially using TV spots) on the actual costs and process of retrofitting and introduce targeted financial support or subsidies for vulnerable homeowners to make retrofitting both accessible and economically viable. To this end, addressing banks' reluctance to finance seismic retrofitting is essential and could be achieved by implementing government-backed risk mitigation measures—such as partial loan guarantees or interest subsidies—and fostering PPPs to share risks and improve access to capital for high-risk buildings.

Reforming seismic building codes

Romania has several opportunities to improve seismic risk management, including updating seismic design norms like the P100-1 and creating new regulations for specific sectors, such as retrofitting cultural heritage buildings (P100-8) and designing for infrastructure like pipes, tunnels, and bridges. There is a need for better seismic isolator testing norms to encourage wider adoption as well as for operationalizing MDPWA's National Building Registry and updating the post-earthquake assessment methodology (ME-003/2007). Addressing these gaps and improving collaboration between ministries, such as MDPWA and the Ministry of Culture, for example, in the case of updating the P100-8 norm, could strengthen Romania's approach to seismic safety and risk reduction.

Secure funding for land use planning: the National Building Registry

To effectively mitigate seismic risks, it is essential for land planning frameworks to incorporate comprehensive risk assessments and unblock, reallocate and secure funding for the release of digital resources such as a National Building Registry. Integrating hazard considerations into planning documents and sectoral strategies—through systematic data collection and improved granularity of available information—will enable local authorities to prioritize interventions in vulnerable areas, ensuring that both new developments and existing structures can withstand seismic events. To this end, Romania should prioritize reallocating or securing alternative funding of the National Building Registry and prioritize integration with cadastral and other national databases to enable data-driven risk management and infrastructure planning.

Improving health care and cultural heritage resilience

Scaling up retrofitting efforts in critical sectors like health care and cultural heritage offers a key opportunity by prioritizing buildings for seismic protection and allocating funds based on best

practices from ongoing projects, such as those in education regarding the 12 schools prioritized by the Ministry of Education and Research (MoE) and emergency infrastructure set forward by MoIA and retrofitted with World Bank funding. Expanding priority lists for no-regret investments, improving coordination with relevant ministries (for example, MoH and Ministry of Culture), and leveraging data on vulnerabilities can enhance the efficiency of fund usage, especially at Bucharest City Hall level (see Table 3). Strengthening collaboration between DRR actors, including public and private sector involvement in exploring emergency intervention funds and seismic insurance, is essential for improving sector resilience as well as coordination between sectoral ministries and GIES for elaborating evacuation and response plans as well as business continuity plans, particularly in health care, where approximately 45 percent of existing buildings could be highly vulnerable to earthquakes.[66]

Building trust through prevention activities and awareness

To enhance seismic prevention efforts in Romania, it is crucial to build public trust in retrofitting programs through targeted solutions. The first step would entail conducting comprehensive cost-benefit analyses of proposed prevention measures, which can provide evidence-based justification for investments, thus fostering informed decision-making and efficient allocation of resources. This could be followed by promoting prevention activities across all levels of governance, ensuring they are supported by clear, actionable local-level guidelines tailored to the unique needs of each community. Additionally, targeted risk awareness campaigns should be designed to educate the public about seismic risks and the benefits of retrofitting programs while also making sure to portray current programs realistically with all costs and measures implied to avoid bottlenecks in the retrofitting process and loss of image of state authorities leading the process (e.g., AMCCRS). These campaigns should aim to build trust and encourage proactive participation in earthquake preparedness and mitigation efforts, ultimately creating a culture of resilience.

[66] GoR 2024.

Table 3. Potential sectors/types of assets for Bucharest priority strengthening interventions

Source: World Bank 2021c.

Sector	Category of assets	
Local public administration assets (SRI and SRII)	- Emergency response assets (fire stations and so on) - Designated shelters/evacuation/feeding centers spaces - Public administration buildings (especially those with emergency response responsibilities) - Assets owned by local authorities providing services to the public that may be critical following a disaster (identification, land registry, social care and support, and so on)	**Targets and timelines to be set with stakeholders, for example:** People benefiting from safer and more resilient buildings and Percentage of the building stock more resilient to earthquakes.
Health Sector	- Hospitals (especially those providing emergency services) - Heath centers	
Education Sector	- Schools (secondary/primary, dormitories, higher education) - Kindergartens	
Transport Sector	- Bridges and underpasses	
Culture Sector	- Museums, galleries, theaters, and so on	
Residential Sector	- Condominium with soft story - Condominium with or w/o commercial spaces - Condominium with similar typologies - Single household	

EARTHQUAKE EARLY WARNING SYSTEMS AND PUBLIC AWARENESS

This chapter focuses on early warning systems (EWS), earthquake early warning (EEW), and public awareness. While long-lead time forecasting of earthquakes is not possible, short-term warnings of several seconds can be feasible, enabling protective actions that can reduce casualties or damage. However, timely alerts must be combined with adequate training and an educated public to successfully enhance societal resilience against earthquake risks.

DRM CONTEXT

Romania has operational multi-hazard EWSs for risks such as extreme weather and floods, with seismic early warnings currently being provided to relevant authorities but not to the public. There are sector-specific EWSs for monitoring extreme weather and floods, benefiting from real-time data sharing and cross-border collaboration, especially for transboundary events. The RO-ALERT system, compliant with the European Electronic Communications Code, has been operational since 2019 under the management of MoIA through its Department of Emergency Situations (DES) and GIES. RO-ALERT can issue geo-targeted emergency alerts to mobile phones in areas affected by natural or man-made disasters, based on requests from sectoral and local authorities. RO-ALERT relies solely on mobile phones for alerts and has some limitations in device compatibility, network coverage, and full utilization of communication protocols. These are addressed by authorities as part of efforts to expand multi-hazard and impact-based approaches, enhance cross-sectoral coordination, and fine-tune alert mechanisms to better serve the population.[67] A 2021 national survey with 1,690 respondents revealed areas that could benefit from improvement in disaster preparedness, indicating a significant need for authorities to enhance public disaster education, leverage existing communication platforms like RO-ALERT, and capitalize on the public's willingness to engage in preparedness and community support efforts.[68]

DES,[69] under the coordination of MoIA, is responsible for public communication regarding emergencies and disasters and manages the official multi-risk national preparedness platform, Be Prepared (*Fii Pregătit*). GIES, through its County Inspectorates for Emergency Situations (CIES) and the Bucharest-Ilfov Inspectorate for Emergency Situations (*Inspectoratul pentru Situaţii de Urgenţă "Dealul Spirii" Bucureşti-Ilfov,* ISU BIF), leads the national risk communication and preventive information efforts through multiple channels, including its website, subordinate units' sites, social media platforms, public information sessions, and preventive exercises, as well as the development of emergency management regulations.[70] Secondary authorities and public institutions may also create their own risk management protocols.[71] Additionally, the MoE and GIES implement risk communication and education in schools, supported by the CIES at local levels. Media organizations, under Law No. 481/2004, are required to report on DRR and collaborate with civil society for awareness activities. MoIA also oversees public alert systems, with contributions from various ministries and agencies, including the MEWF, Ministry of Culture and Identity, and the Special Telecommunications Service.[72]

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[67] EC. 2023b. *Peer Review Report: Romania - Civil Protection and Humanitarian Aid*. Link. It notes that local authorities often lack resources to respond effectively before or during emergencies, and public warning is frequently compromised due to malfunctioning or absent public alert equipment (for example, sirens).

[68] The survey was part of the 'Disaster and Climate Resilience Development Program' project implemented by MoIA and MDPWA in 2021. Half of the respondents lack disaster preparedness knowledge, and one-third do not believe they will be affected by a disaster. While 75 percent support improved access to information, many feel underinformed about natural disasters. Additionally, 83 percent are willing to assist their community in a disaster, with 96 percent open to volunteering. About 75 percent are interested in first aid training, and over three-quarters are aware of and prefer receiving disaster information through RO-ALERT. GoR 2024.

[69] See GoR. 2004. *Emergency Ordinance No. 21 of April 15, 2004, regarding the National Emergency Management System*. Link.

[70] GIES (General Inspectorate for Emergency Situations). 2020. *Summary on Disaster Risk Management, Bucharest*. Link.

[71] GoR. 2022. *National Seismic Risk Reduction Strategy*. Link.

[72] GoR 2024.

CURRENT ARRANGEMENTS

Preparedness and public awareness

Romania's strategy for earthquake risk communication is guided by several key frameworks, including by chapter 14 of the NSDRR and relevant legislation such as Law No. 212/2022, amended and supplemented by Law No. 426/2023 on seismic risk reduction. Although GD No. 557 of August 3, 2016, mandates MDPWA as the primary government authority responsible for managing seismic risk, MoIA and other ministries and local authorities further contribute by running campaigns to raise awareness about seismic risks and promote preparedness. Regarding seismic education and preparedness efforts, several key initiatives have been developed in the last decades[73]; the most current one being the I Don't Shake during an Earthquake (*Nu tremur la cutremur*) campaign, ongoing since 2015. Regular public alarm drills, like Drills' Wednesday (*Miercurea Alarmelor*) and informational displays in public transport and outdoor advertising, further support these efforts. While in recent years, special focus has also been given to expanding the concept of mobile caravans for nationwide population preparedness.

Additionally, DES and GIES have demonstrated in recent years a strong commitment to prioritizing disaster preparedness, including seismic, for PwDs, working to create an inclusive emergency system through a range of initiatives. Romania has enhanced its disaster preparedness by relaunching the Be Prepared (*Fii Pregătit*) platform with internationally aligned and accessible guides and features for PwDs, while accessible content for other vulnerable populations, such as children, is still under consideration. This content is also accessible on a mobile application, the DES Application (*Aplicația DSU*). Moreover, DES and GIES have been training over 600 emergency responders through a three-year pilot project, planning to scale this training nationwide, while also currently working on spearheading a nationally standardized accessible and adapted disaster preparedness course to train 10,000 PwDs and support them in completing emergency plans by 2027, while also signing new collaboration protocols and key disability organizations to strengthen community outreach and support.

Despite recent efforts, disaster preparedness activities remain uneven nation-wide, often inaccessible to PwDs and foreigners, with no standardized training for instructors or formal school curriculum in place to be implemented systematically. Disaster preparedness courses, including first aid, are yet to be standardized nationwide, which makes it difficult to monitor their effectiveness, while also not being fully accessible to PwDs and foreign populations due to a lack of adaptation and language support. GIES staff responsible for preparing the population could benefit from standardized professional formal training to develop the necessary skills to effectively teach these courses using modern and inclusive methods. Additionally, there is currently no formal and systematic disaster preparedness curriculum implemented in schools, despite the fact that the training of children and young people in emergency situations remains a constant concern at the national level. This is carried out in accordance with the provisions of the Cooperation Protocol on emergency preparedness for children, pupils, and students in the national pre-university and higher education systems, signed as early as 2013 between the MoIA and the MoE.

Earthquake Early Warning Systems (EEWS)

Seismic monitoring and research in Romania are conducted through two key networks: the National Seismic Network, managed by the National Institute for Earth Physics (NIEP), and the National Seismic Network for Constructions, managed by the National Research and Development Institute for Construction, Urban Planning, and Sustainable Territorial Development (*Institutul Naţional de Cercetare – Dezvoltare în Construcţii, Urbanism şi Dezvoltare Teritorială Durabilă URBAN-INCERC,* INCD URBAN-INCERC) for over 40 years. The National Seismic Network includes over 160 locations with 311 seismic sensors, transmitting real-time data to the Seismic Monitoring Center in Măgurele. NIEP operates 11 seismic observatories, a multidisciplinary geophysical network, and a Global Navigation Satellite System/Global Positioning System network with 29 measurement points for crustal monitoring. The National Seismic Network for Constructions includes 57 seismic stations monitoring ambient vibrations from seismic and non-seismic sources, with 32 connected to a real-time transmission system.[74]

The EEWS is operated by the NIEP overseeing Romania's seismic monitoring via the Romanian Seismic Network and National Seismic Data Centre. The EEWS is activated for earthquakes exceeding 3Mw nationwide or 4Mw in the Vrancea region. Upon detection, NIEP swiftly provides

[73] Among the earthquake preparedness campaigns developed by DES and GIES, the following can be mentioned apart from the *Nu tremur la cutremur* campaign: the National Anti-seismic Education Program (1990–2007) developed and distributed safety materials; ROEDUSEIS_NET (2012–2016) integrated earthquake education into schools; INFORISX (2006–2007) created a comprehensive website on seismic risk; Safe Quake (2010–2011) improved earthquake response through awareness and training.

[74] NCES 2020.

seismic data, shake maps within 10 minutes, and casualty estimates within 30 seconds to 15 minutes, depending on the magnitude. The system can provide pre-warnings up to 20 seconds before the earthquake impacts, targeting government agencies and critical infrastructure, including GIES, county inspectorates for emergency situations in the southern part of the country, the Cernavodă and Kozloduy nuclear power plants, the Vidraru and Bicaz dams, and several private sector beneficiaries.[75] However, public alerts are not yet implemented to avoid potential panic and potential loss of lives until preparedness levels increase. NIEP also supports the Aristotle initiative by delivering reports to the Emergency Response Coordination Centre within 3 hours and has been gathering geo-localized public perception data after earthquakes following events in April 2020 and May 2021.[76]

Additionally, the RO-ALERT system, operational since 2019 and compliant with the European Electronic Communications Code, is often mistakenly seen as an EEWS, but it is actually intended for post-earthquake communication with the public, alongside the electronic siren network, which requires an inventory to evaluate its coverage and functionality.

KEY OPPORTUNITIES

Ensuring timely and appropriate life-saving behavior of the population in Romania during an earthquake, the following three key opportunities have been identified: (1) enhancing seismic risk communication through more targeted, cohesive, inclusive, and behavior-focused awareness campaigns; (2) scaling up inclusive earthquake preparedness considering various needs of different vulnerable populations, with a special focus on PwDs; and (3) continuing (E)EWS modernization for efficient alerting.

Enhancing seismic risk communication and awareness campaigns

To significantly enhance earthquake risk communication, public awareness, and the preparedness of citizens in Romania, several strategic opportunities should be leveraged for more targeted, cohesive, inclusive, and behavior-focused campaigns. Public awareness around seismic risks could benefit from broader outreach, as many people may not fully grasp the urgency and importance of seismic risk reduction. Using multiple channels for disseminating information, such as mass media, including radio, and social media, would help reach as large a percentage of the population as possible. Developing a cohesive and integrated communication approach that involves central and local authorities, CSOs, and media outlets is crucial for amplifying effectiveness, leveraging current strategic commitments under Chapter 14 of the NDRRS. Increased funding for seismic risk communication and expert consultation will help tailor messages to diverse audiences. Additionally, communication strategies could be improved through systematic evaluation, as the impact of different campaigns can vary.

Scaling up inclusive earthquake preparedness

Opportunities for enhancing inclusive disaster preparedness, including seismic, are substantial, particularly through current national initiatives led by DES and GIES in collaboration with local OPDs aligned with reforms under international commitments. Expanding the Be Prepared (*Fii Pregătit*) platform to include resources for children and accessible content like audio guides and videos with Romanian Sign Language interpretation will enhance accessibility and build on ongoing efforts with national grassroots organizations to improve content for people with different disabilities. The ongoing project led by DES and GIES, in partnership with national OPDs and supported by the World Bank, aims to enhance disaster preparedness for PwDs, including seismic preparedness, and is set to scale up to reach 10,000 PwDs by 2027 (see Box 2). Additionally, these initiatives could be further supported through inclusive updates in existing training resources, such as the Be Prepared SMURD Caravana and the DES mobile training center, featuring advanced simulation equipment, as well as in acquisitions of assistive technologies and other learning materials needed to support inclusive preparedness.

Increasing seismic and broader risk awareness in schools is essential, supported by specialized training in life-saving skills and equipment such as automated external defibrillators (AEDs) and first

[75] NCES 2020.
[76] EC 2023b.

aid kits. Tailored, inclusive, and action-oriented programs integrated into the curriculum can strengthen preventive education, while community outreach initiatives and other efforts, such as first aid training for teachers and equipping schools with AEDs and first aid kits, enhance preparedness. Leveraging good practices from ongoing pilot projects by the MoE, DES, and GIES with support from the World Bank under the *Romania Safer, Inclusive, and Sustainable Schools Project* in selected schools presents an opportunity to scale these efforts nationwide, benefiting both the school community and broader disaster readiness initiatives.

Finally, expanding preparedness information and activities to all vulnerable and marginalized populations, including the Roma community, is essential. This can be achieved by operationalizing the NDRRS and by adapting, expanding, and scaling up existing successful initiatives, such as current projects designed for PwDs and for children, supported by the World Bank.

Continuing (E)EWS modernization

Seismic-specific enhancements to EWS should prioritize expanding accessibility, while the overall system has several other opportunities for enhancement, as underlined in the 2023 UCPM Peer Review.[77] Strengthening governance through regular testing, staff training, and public awareness campaigns is needed to refine the EWS overall. Given Romania's unique tectonic conditions, there is a unique opportunity for public access to an EEWS to be prioritized, as it has the potential to save lives. A multidisciplinary pilot project could assess the most effective public recommendations and response strategies, serving as a foundation for evaluating how the EEWS should be expanded to the wider population. The EEWS system should be fully automated, similar to the approach in Japan, with no human intervention, from data collection to alert transmission. Given that the RO-Alert system is not compatible for real-time early warning due to potential delayed alert delivery, it could instead be used to provide the public with guidance on what to do during an earthquake or post-event instructions on evacuation, correct behavior, and safe locations. Complementing this with comprehensive activities on public seismic preparedness and educational campaigns on interpreting and responding to alerts would empower individuals to take timely and effective action during an earthquake.

Additionally, allocating resources to local authorities and creating an inventory of public post-seismic alert equipment, such as the network of electrical sirens, would provide a clear overview of the system, serving as a foundation to modernize it by improving functionality, ensuring regular maintenance, and potentially expanding the network, thereby enhancing overall (post-)seismic warning and communication effectiveness.

[77] EC 2023b.

Box 2. Romania's inclusive DRM activities supported by the World Bank

Romania has recently advanced efforts to place PwDs at the center of the emergency system by adopting an integrated and inclusive approach to DRM, with support from the World Bank. The following initiatives position Romania as a best practice example in the region for inclusive approaches to disaster preparedness:

1.Over 600 emergency responders were trained in 10 high seismic risk counties to assist PwDs during emergencies, with PwD representatives leading courses, creating syllabuses, and developing materials, including a pocket guide for interventions.

2.A Train-the-Trainers (ToT) program was developed to train firefighters nationwide on assisting PwDs, with plans to scale up to all firefighters in the country, ensuring sustainability, building capacity, and transferring ownership.

3.Inclusive disaster preparedness course and resources for PwDs are under development to prepare 10,000 individuals with disabilities by 2027, including an implementation manual for emergency personnel to serve as a foundation for nationwide training.

4.The national preparedness platform, Be Prepared,[116] relaunched on March 1, 2024, introduced over 20 new adapted and accessible multi-hazard guides, including a specific guide for PwDs, multi-language content, AI features, 18 audio guides for the blind (in partnership with ANR), and ongoing development of sign language video guides (in partnership with ANSR).

5.Three new collaboration protocols were signed with key national OPDs to expand outreach and inclusion, namely the National Authority for the Protection of the Rights of People with Disabilities (ANPDPD), the Association for the Blind in Romania (ANR), and the National Association of the Deaf in Romania (ANSR).

See: World Bank. 2023c. *Strengthening Disaster Risk Management in Romania: Building Modern, Inclusive, Near-Zero Energy, and Disaster-Resilient Fire Stations*. Feature Story. September 13, 2023. Link.

[116] See the Be Prepared (Fii Pregătit) platform. Link.

EARTHQUAKE PREPAREDNESS AND EMERGENCY RESPONSE

This chapter focuses on earthquake preparedness and emergency response. Earthquake preparedness includes pre-earthquake measures to ensure an effective response, including rescue capacity, training, and situational awareness. Earthquake emergency response includes (i) the activities and processes regarding the response phase of a seismic event, including emergency and evacuation plans, training and exercises for emergency personnel, and operational measures to reduce impacts and (ii) the framework concerning the actions taken in the immediate aftermath to days or weeks after an event.

DRM Context

Romania has made significant efforts to strengthen its multi-hazard emergency preparedness planning. This includes the development of response concepts for major risks (earthquakes, floods, nuclear accidents, and wildfires). Other initiatives have included public awareness campaigns, training programs, and practical disaster simulations. GIES, responsible for emergency preparedness, has continuously improved tools and raised awareness, establishing the National Training Center for Emergency Management and three regional centers in 2004 to provide regular training for public administration representatives. This training and exercise system is centered on the National Centre for Improving Training in Emergency Situations Management (NCITESM) and three Zonal Training Centres in Cluj, Craiova, and Bacău. These centers offer comprehensive training for both operational personnel and public administration staff (for example, mayors), including specialized courses for disaster assessment, response coordination, and incident management, with curricula updated by GIES after major disasters.

Romania's emergency response system has a clear command structure, integrated decision-making process, and strong interagency cooperation, following a gradual, bottom-up response model, with the possibility of directly mobilizing national-level resources for effective intervention when needed. MoIA is at the core of the system, with DES providing strategic oversight and policy direction, coordinating all functions, including specialized first aid (through the Mobile Emergency Service for Resuscitation and Extrication [SMURD]) and emergency medical care in emergency care units and centers.[78] In addition to DES, GIES at the national level, through its county inspectorates for emergency situations at the local level (CIES), ensures a streamlined approach to emergency management with 284 intervention units and 27,000 professionals, 8 percent of whom are women.[79]

During national emergencies, DES and GIES operate under SNMSU or the National System as per EO No. 21/2024, alongside other public administration authorities and a network of specialized actors, coordinating resources and efforts to prevent, manage, and recover from emergency situations. The National System includes emergency committees, DES, GIES, professional and volunteer emergency services, operational and coordination and intervention-leading centers, and operational centers for emergencies. The decision-making emergency committees, whose decisions are mandatory, consist of the National Committee for Emergency Situations (under the direct leadership of the Prime Minister, as the president), ministerial committees, the Bucharest Municipal Emergency Committee, county emergency committees, and local emergency committees. At lower levels, county committees, led by the prefect and including local officials and business representatives, coordinate emergency responses by assessing risks, implementing measures, and ensuring resources through county plans, while local committees, headed by the mayor, manage emergencies within their jurisdiction by evaluating risks, notifying county committees, implementing responses, and securing resources through local plans.

[78] In addition, the national DES ecosystem of emergency management comprises the General Inspectorate of Aviation regarding medical missions, the public Salvamont and Salvaspeo mountain and cave rescue services, and the canine search-and-rescue activities in emergency situations. See NCES 2020.

[79] Currently, about 642 GIES and CIES staff members per county (including Bucharest) serve a population of 19 million, which falls short of the government's benchmark of 800 staff per county. In 2022, the average emergency response time nationwide was 12 minutes and 22 seconds, projected to improve slightly to 12 minutes and 3 seconds by 2027.

Regarding the volunteer emergency services, the Romanian legal framework defines two types of volunteers: those involved in the volunteer emergency services for prevention and crisis situations (SVSU) (under GD No. 1579/2005) and those in other public or private organizations (SPSU) (under EO No. 26/2000), with spontaneous volunteers such as digital volunteers and community members not having a formal legal status. Current legislation is yet to include specific provisions for the involvement of volunteers from CSOs and spontaneous volunteers in emergency response protocols, disaster reconstruction, humanitarian aid management, gender equality, and addressing gender-based violence (GBV), vulnerability, and discrimination; updates are needed for prevention activities and legal framework improvements regarding equipment provision and volunteer emergency services training.[80]

CURRENT ARRANGEMENTS

The National Post-Earthquake Response Concept in Romania focuses on enhancing and integrating operational capacities, knowledge, and resources across the national, county, and local levels within SNMSU. It aims to establish a general action framework for leading, coordinating, and controlling human and material resources to protect life, property, and the environment during major seismic events, mitigate disaster effects, and ensure a swift return to normalcy. Additionally, it seeks to provide a timely and efficient response to maintain socioeconomic continuity and government functions during significant earthquakes, with continuous adaptation to operational realities. Since 2016, several annual national earthquake exercises have been conducted in Romania to test and validate this concept, focusing on verifying response measures, including specialized modules and equipment; testing the effectiveness of information and decision-making processes without field forces; encouraging international cooperation and assistance; and refining decision-making processes and operational adjustments to improve overall response efficiency.[81]

Training and exercises for emergency personnel

Romania has developed a strong training and exercise framework for emergency management, which are carried out annually at the local, county, national, and even international levels. Romania, through the MoIA, including DES and GIES, is an active player in participating in various consortia for conducting international-level exercises (e.g., bilateral exercises, such as the 'EU ModEX 2018' and 'VIGOROUS WARRIOR 19' and cross-border drills with neighboring countries), as well as preparing and training specialized intervention teams: the medium urban search and rescue team (RO-USAR), two high-capacity pumping teams (RO-HCP), the CBRN detection and sampling team (RO-CBRNDET), two medical teams (RO-EMT), the medical evacuation team for disaster victims by air (RO-MEDEVAC), and two forest firefighting teams with vehicles (GFFF-V-RO). These teams have been made available to the EU Civil Protection Mechanism, and the intervention forces of the Romanian state and CSO personnel deployed to Albania (2019) and Türkiye (2023) gained valuable experience from earthquake response missions, returning with enhanced skills to strengthen disaster preparedness at home. Additionally, while Romania has enhanced the equipment of subordinate units and its facilities mainly through EU-funded projects (e.g., the VISION 2020 investment project), there is still a need to expand training capacity, further enhance facilities, and incorporate modern technologies like virtual reality and online courses to improve preparedness and response capabilities.

Emergency evacuation, shelters and stockpiles

The lack of information on evacuation plans and emergency shelters (i.e., disaster relief camps/ *tabere de sinistrați*) limits effective self-evacuation during disasters, although evacuation routes are outlined in the evacuation plans of cities/the Municipality of Bucharest but may differ from the planned routes depending on the earthquake's consequences. Current legislation focuses on authorities' actions, with little guidance for public self-evacuation. Communities are unaware of emergency shelter locations, evacuation routes, or safe roads/ alternatives for blocked paths. A reason behind this lack of clarity on the location of these disaster relief camps providing safe shelter post-

[80] EC 2023b.
[81] NCES 2020.

seism, typically set up in schools or sports halls, is that authorities cannot effectively plan covering scenarios involving large numbers of victims. While maintaining stockpiles remains a challenge, around 10,000 field beds are available (used during the 2018 national exercise), with a full inventory expected to be undertaken during the national SEISM 2025 exercise in June 2025. In the 2019 version of the PAAR for Bucharest, for example, there are no clear instructions for the population on what to do post-evacuation—such as whether to wait for guidance or self-evacuate—which creates uncertainty and may hinder effective response in the aftermath of an earthquake. Currently, the Bucharest City Hall relies on electronic billboards to display the locations of safe shelters, but this may not be effective in a disaster where electricity is disrupted, making the system potentially unreliable, while reliance on police and gendarmerie for direction may not be sufficient. Additionally, the low accessibility of infrastructure and evacuation procedures not adapted to the needs of PwDs increases vulnerabilities in the event of a disaster. According to the 2020 national survey for the Diagnosis of the Situation of People with Disabilities in Romania, PwDs face significant barriers in accessing homes, public institutions, and evacuating during disasters, with none of the 1,442 evaluated institutions being fully accessible, while 75–79 percent.[82]

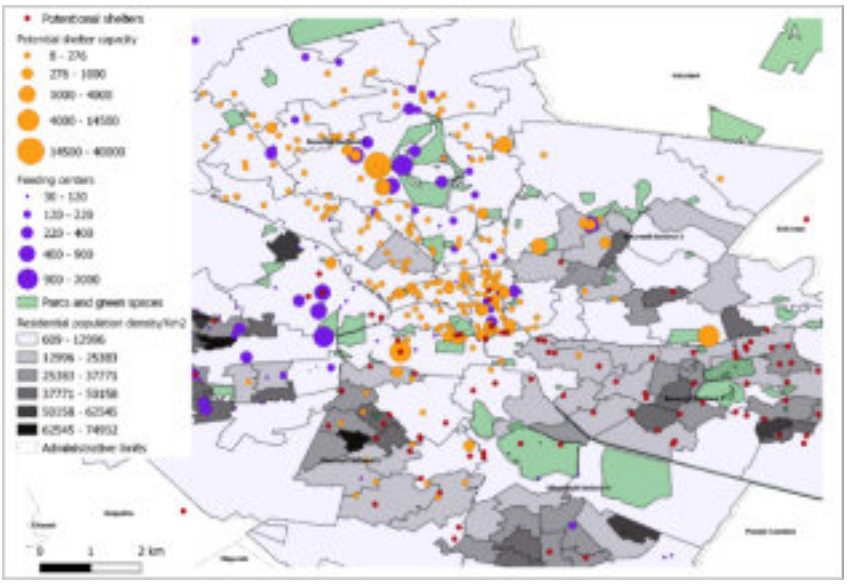
Civil society engagement and volunteer emergency services

Romania's rescue capacity in the event of a national-level earthquake, the entire SNMSU is involved, with particular emphasis on the response of the DES and the structures under its coordination (GIES, IGAv) as well as those under operational coordination (e.g., the emergency reception units and the ambulance services), including voluntary emergency services, and private emergency services. The volunteer system includes two categories: 'Volunteers within the volunteer service for emergency situations', numbering nearly 60,000, and 'Rescuers for passion', with about 6,600 members. Volunteers are organized and trained at local levels according to GD No. 1579/2005, and their activities include prevention, medical first aid, and awareness campaigns. Despite being supported by a structured framework, Romania's volunteer system faces challenges such as limited technical, administrative, and financial resources, an aging volunteer base with low turnover, insufficient incentives to attract younger volunteers, modest financial support, and the need for better integration of volunteer services within local public administration. Whereas private emergency services are required by law in high-risk industries and large public buildings, to provide support in emergencies at key economic operators requiring such services with a focus mainly on fire-related incidents and thus are confined to operating within their specific facilities, limiting their broader involvement.

[82] WB 2021a.

Figure 5. Emergency shelter and feeding capacity of Bucharest as planned in RADP 2019 and spatial distribution of population density

Source: World Bank 2021c.



Additionally, DES has acknowledged the vital role of civil society in risk management by creating a dedicated unit for civil society relations and currently holds 50 cooperation protocols with CSOs, academic institutions, and private entities to support SNMSU response efforts in the event of an earthquake. Social workers and CSOs are essential in engaging vulnerable communities and linking national authorities with local populations, exemplified by their effective management of the Ukrainian refugee crisis using a Microsoft Teams platform. The absence of a clear legislative framework for civil society engagement in DRM poses challenges to effective collaboration. Strengthening these partnerships with CSOs through defined roles and responsibilities, alongside targeted training programs, would foster a more cohesive approach and enhance interoperability.

Post-earthquake assessment

Currently, post-earthquake assessments in Romania are guided by the ME-003/2007 Methodology pending update, with a new post-earthquake rapid assessment application under development. GIES, MDPWA and ISC are currently finalizing the methodology—pending certain clarifications—with the aim of making it easier to apply and less subject to contestation before it enters ministerial approval. Whereas, a first draft of this app is expected by December 2024, with approval anticipated in 2025. This app, designed for use by assessment teams in the field, will collect data through pre-prepared formats, distinct from the pre-disaster data collection processes. GIES will manage the integration of these data for use in guiding interventions and resource allocation. Additionally, training courses for nonspecialist assessment teams will be developed, and funding for these initiatives is already secured.

KEY OPPORTUNITIES

Optimizing overall readiness, response coordination, and resource allocation in Romania related to a seismic event would require implementing the following four key opportunities: (1) expanding training and exercises for emergency personnel by enhancing facilities, adopting advanced tools, and creating customized programs tailored to operational challenges and the needs of different populations, such as PwDs and women; (2) strengthening civil society and volunteer partnerships by providing technical and financial support as well as formalizing volunteer integration in local governance; (3) enhancing emergency evacuation, shelters and stockpiles availability and maintenance; and (4) operationalizing and implementing post-earthquake assessment.

Expanding training and exercises for emergency personnel

Romania has significant opportunities to enhance its emergency management and civil protection systems by investing in expanding training capacity, upgrading facilities, incorporating modern tools, and tailoring programs. Key priorities include developing a robust national emergency response system, enhancing the command-and-control system of GIES, and integrating local intervention units to reduce response times. Challenges include strengthening the capacity of central and local authorities, CSOs, and the private sector involved in emergency management, which requires additional financial resources, technical equipment, and specialized personnel. Increasing the training capability of the National Centre for Improving Training in Emergency Situations Management (NCITESM) and its regional centers beyond the current 3,000 people per year could address the growing demand and improve preparedness. Upgrading training facilities and incorporating modern IT tools, such as virtual reality and online courses, would enhance the effectiveness and reach of training programs. Additionally, providing specific training tailored to the needs of diverse population groups and individuals with disabilities would ensure more inclusive and effective emergency management. Emphasizing prevention and awareness in training curricula would also strengthen the role of local authorities in managing emergencies. Addressing challenges with the Emergency Management Information System by ensuring efficient data integration and regular updates could further improve system performance. Overall, these steps would contribute to a more robust and responsive national emergency management framework.

Expanding inclusive training for emergency personnel is crucial, building on a successful pilot project that laid the groundwork for enhanced prevention and response efforts in communities. The 'Inclusive Disaster Resilience' project, supported by the World Bank and a Global Facility for Disaster Reduction and Recovery (GFDRR) grant, in partnership with DES and GIES and national-level OPDs, trained over 600 first responders in inclusive interventions for PwDs, as of April 2025. This initiative utilized innovative curricula and materials, now integrated into the GIES course packs. The project's success, including a Training of Trainers session, provides a solid foundation for scaling the program nationwide. Continued efforts in this

direction would enhance emergency management by ensuring it effectively addresses the needs of diverse population groups and PwDs.

Strengthening civil society and volunteer engagement

There are opportunities to enhance Romania's rescue capacity by improving the technical and financial support for the volunteer system and CSOs and integrating volunteers more formally within local governance structures. Expanding incentives for new volunteers, such as additional benefits (for example, free public transport at the local level) and targeted information campaigns, could increase engagement and address the aging volunteer demographic. Opportunities for improving disaster response could be achieved by enhancing the legislative framework for civil society involvement, which would strengthen coordination and integration of CSOs into DRM. Implementing targeted training at national and local levels, along with providing necessary equipment, could boost community engagement, improve response effectiveness, and ensure additional capacity when needed. Leveraging already successful PPPs, like the Microsoft Teams platform used for recent emergencies including the COVID-19 crisis, could be extended to other phases of disaster management, such as prevention. New technologies, such as the ongoing development of the Resource & Volunteer Management[83] tool developed by Code for Romania (IT CSO) and managed by DES, enabling the management of volunteer resources, materials, and their storage locations during disasters of any kind, can effectively support disaster management efforts if it receives the necessary backing from CSOs, enabling better coordination and resource distribution during crises.

Enhancing emergency evacuation, shelters and stockpiles availability and maintenance

Romania could revise evacuation plans and emergency shelters and stockpiles, ensuring they are inclusive and well-known, while developing flexible and mapped solutions through public-private collaboration. Evacuation plans, particularly for schools, should be revised to address vulnerable groups' needs, incorporate risk assessments and hazard maps, update regulations to international standards, and ensure public awareness through displays and drills. While useful for managing post-disaster population flow, their reliability during an earthquake is uncertain in Romania due to limited data on vulnerable buildings, highlighting the need to scale up building evaluations and integrate results to better map evacuation and safe routes. This can be achieved through public displays and conducting partial or full evacuation drills, along with other activities to familiarize the population with evacuation procedures. Regarding disaster relief shelters and the challenge of planning for large-scale victim scenarios, authorities could develop scalable contingency plans with tiered response levels, pre-contract with private sector partners for increased capacity, and invest in modular shelter infrastructure that can be rapidly deployed ensuring it is kept well maintained, while also collaborating and supporting local volunteers and CSOs to manage neighborhood-level micro-shelters. Additionally, there is an opportunity to engage private operators to pre-arrange access to stockpiled resources, easing the burden on public agencies and centralized facilities.

Operationalizing and implementing post-earthquake assessment

The planned developments in post-earthquake assessment include the creation of a rapid assessment application to improve data collection and integration, alongside updating the ME-003/2007 methodology to align with international standards. Once the app is approved and operational, there is potential to enhance the efficiency of disaster response through real-time data sharing between assessment teams and GIES. The platform could be expanded to include mobile or cloud-based technologies to ensure timely updates and data sharing during post-disaster recovery. Furthermore, the training of nonspecialist assessment teams opens avenues for greater community involvement and capacity-building in disaster response should be improved. Clarification regarding the type of data expected by GIES will be critical in ensuring that the system is fully optimized for resource allocation and response coordination. Additionally, the MDPWA is considering developing a new platform to be interconnected with this post-earthquake EVR platform, pending alignment discussions with GIES; and plan to launch a new procurement process for this new platform once the methodology is approved. Additionally, regarding the current update of the methodology, it is essential to ensure that it is aligned with international standards and includes all provisions already mentioned in the NSRRS, such

[83] RVM (Resource & Volunteer Management). Code for Romania. Link.

as establishing clear evaluation criteria, defining evaluator responsibilities, introducing simplified investigation methods, clarifying inspection roles, and developing framework solutions for immediate interventions to secure damaged buildings.

EARTHQUAKE RECOVERY, RECONSTRUCTION, POST-DISASTER FINANCING

This chapter covers earthquake recovery, reconstruction, and post-disaster financing. This refers to actions taken after the response phase when priorities shift toward restoring affected areas, rebuilding buildings and infrastructure, and helping communities return to normal.

DRM Context

GIES is planning a unified methodology for damage assessment in emergency situations/disasters, while a distinction between damage and loss is still to be officially clarified. According to GD No. 1492/2004, the management of emergency situations data is overseen by GIES, with local support from (CIESs). After a disaster, local committees or special commissions collect disaster loss data in analog or digital format, and this information is then transmitted through the Information Management System for Emergency Situations to aid decision-making and facilitate external funding from entities such as the EU and UN. Evaluating the economic impact of disasters is the responsibility of all authorities involved in DRM, a key tool for strategic resource planning. However, due to the lack of dedicated tools, fragmented or inaccessible information, and absence of collaboration protocols, these evaluations often focus only on physical impact without assigning an economic value. Damage evaluation commissions, formed by specialists designated by the prefect, assess losses during emergencies but lack a specific methodology, which can lead to inaccurate values and reluctance to include economic data in post-event reports crucial for local recovery fund allocations. GIES is aiming to develop an IT system based on a unified methodology for damage assessment in emergency situations/disasters, improving the economic impact assessment methodology already developed in the RO-RISK project. This updated methodology will be applicable not only for evaluating future risk scenarios but also for assessing post-disaster damage to gather historical data, aiding in the identification of major impact scenarios. The IT system will be based on this methodology and will consist of: (1) customized software for calculating economic impact and (2) a database with physical, statistical, and financial data, interconnected with other national databases.[84]

Romania covers disaster costs through the Government Reserve Fund and the Intervention Fund, allowing flexible resource allocation for initial disaster expenses (per Law No. 500/2002). Different ministries manage disaster-related budgets, and the Ministry of Finance (MoF) can reallocate funds. Romania has mandatory household insurance (through the Pool for Natural Disaster Insurance [*(Pool-ul de Asigurare Împotriva Dezastrelor Naturale,* PAID]) which covers three catastrophic risks—earthquakes, floods, and landslides—up to €20,000 or €10,000.[85] Despite an ascending trend in recent years, insurance penetration in Romania remains below the European averages of 7.4 percent and €2,100 per capita. Between 2013 and 2023, insurance companies affiliated with the National Union of Insurance and Reinsurance Companies in Romania (*Uniunea Națională a Societăților de Asigurare și Reasigurare din România,* UNSAR) provided nearly €20 million in financial support for restoring homes affected by floods, earthquakes, and landslides, with payouts in the previous year being five times greater than in 2022.[86]

[84] GIES. Terms of Reference for Consulting Services to Create a "Unified Methodology for Damage Assessment in Emergency Situations/Disasters." Link.

[85] Law No. 260/2008 on the compulsory insurance of buildings against earthquakes, landslides, and floods. Link. depending on the construction type, regardless of the property's actual value, with fixed premium rates differing for urban and rural areas.

[86] UNSAR (National Union of Insurance and Reinsurance Companies in Romania). 2024c. "Press Release - EUR 20 Million in Compensation Paid for Restoring Homes after Natural Disasters." Link.

RoTTmania has no public asset insurance. Romania also uses international financial sources such as contingency funding (including from the World Bank),[87] donor assistance, and the EUSF.[88] Given potential government liabilities, the current arrangements may not be sufficient in case of major disasters.[89]

CURRENT ARRANGEMENTS

Damage and loss assessment

Romania is currently developing a unified methodology for disaster data collection through two projects, with plans for informal consultations with ministries before formal submission. The first project led by GIES in partnership with the World Bank focuses on creating a damage and loss assessment methodology and corresponding software to record disaster losses. While, the second project, funded by the EU, aims to implement DesInventar, enabling GIES to produce periodic reports for the Sendai Monitor. The resulting IT system will integrate data from the damage assessment software, alongside additional information on the economic impacts of disasters. A distinction between damage and losses is still to be officially clarified. Authorities aim to test the methodology through a pilot exercise and propose using multiple evaluation methods—4 to 5 per type of exposed element. Challenges remain, particularly in determining asset value; discussions with stakeholders like UNSAR are ongoing, especially around using insurance values, though consensus is lacking due to the low value of mandatory disaster insurance (PAD) which hinders realistic estimations. The digital platform to follow the methodology is intended to support on-site evaluation teams by allowing local authorities to input field data directly, while calculations will be automated via a platform-accessible algorithm, improving consistency and ease of use through mobile devices or tablets.

Understanding potential disaster impacts and risk-informed budgeting

The MoF incorporates fiscal risk into strategic documents, estimating that earthquake scenarios could lead to damages of up to €26.257 trillion, with the highest loss of €16.383 trillion (2020) from a 1,000-year return period earthquake of magnitude over 8,[90] using data from the RO-RISK platform. The NDRMP outlines measures, funding sources, and implementation timelines regarding said earthquake risks. The NSRRS projects that €13.6 billion will be needed by 2030, focusing on building consolidation, with €1.5 billion allocated for public buildings, while European funding through various programs, including the NRRP,[91] will support these efforts. This is complemented by an LTRS, approved in 2020, which highlights the €12.8 billion of investment needs for improving the energy efficiency of Romania's building stock by 2030. Additionally, communication and training activities will be funded by national and local budgets, with an annual budget of €119,000.

[87] Second Disaster Risk Management Development Policy Loan (DPL) with a Catastrophe-Deferred Drawdown Option (Cat DDO).

[88] As of 2025, Romania has received over €161,10 million from the EUSF to address such crises. Link.

[89] World Bank 2023. In the event of a major disaster, government liability in Romania could exceed 0.4 percent of gross domestic product (GDP) due to the high vulnerability of residential buildings and public assets, with over 50 percent of potential losses tied to residential buildings. World Bank (2024).

[90] GoR 2024.

[91] The NRRP allocates €2.2 billion to efforts aligned with the EC's Renovation Wave initiative to drive energy-efficient renovation of buildings.

Box 3. Contingency finance: World Bank Cat DDO

Romania's financial resilience was strengthened through access to predictable contingent financing amounting to €466.9 million (US$500 million equivalent) approved by the World Bank.

This new Cat DDO program in Romania is proposed as an International Bank for Reconstruction and Development loan and will help the GoR advance key disaster and climate resilience reforms that are fully aligned with the FY25–29 Country Partnership Framework for Romania and contribute to the World Bank Group's mission and priorities, particularly as they relate to climate change and crisis preparedness. Policy reforms are organized under two pillars: (1) strengthening inclusive multi-hazard preparedness and response with a focus on vulnerable groups through improved emergency response access, disability-inclusive disaster preparedness, and GBV transformative training for first responders and (2) advancing DRR and climate change efforts by enhancing resilience of the physical environment, preparedness in schools, and zero-emission urban mobility. This Cat DDO operationalizes the World Bank's Crisis Preparedness and Response Toolkit by enabling the potential use of the Rapid Response Option[92] and the recommendations of the 2023 Romania Country Climate and Development Report (CCDR) by fostering strategic integrated water resources management, promoting climate action across key sectors, and enhancing EWS and public awareness. It leverages reforms and results of the World Bank's previous contingent credit line to Romania under Cat DDO1 (2018–2021), ongoing Investment Project Financing loans, and innovative advisory services provided to Romania related to disaster, flood, and seismic resilience, urban development, and education sectors.

Source: Romania Second Disaster Risk Management Development Policy Loan with a Cat DDO. Link.

[92] The Rapid Response Option was signed by the GoR on June 13, 2024, which can provide additional funds from Romania's portfolio of World Bank operations, if needed, in case of an emergency.

Government instruments

The Government allow for flexible resource allocation for disaster expenditures by the MoF through two instruments: the Reserve Fund and the Intervention Fund (as per Law No. 500/2002). Additionally, different ministries manage disaster-related budgets, such as MDPWA for seismic-related expenditures, while local authorities can use existing resources and budget lines, reallocate as needed, and request additional funds from the Reserve Fund. For instance, following the February 2023 earthquakes in Gorj County, the GoR allocated €10.4 million from the annual state budget's Intervention Fund to aid in the rehabilitation, consolidation, and reconstruction of 16 buildings, including schools and sports facilities.[93] Additionally, complementary to the state budgetary instruments, Romania recently secured, in the fall of 2024, a contingent finance that could be used for earthquakes from the World Bank in the form of a second Cat DDO amounting to €466.9 million. However, current fiscal resources are insufficient for extreme seismic events, highlighting the need for sustainable disaster risk financing.

Earthquake insurance

In Romania, catastrophe insurance for households—including earthquake coverage—is mandatory by Law No. 115 and serves as a prerequisite for obtaining optional insurance policies. Recent regulatory updates, effective November 12, 2023, to Law No. 115 amending and supplementing Law No. 260/2008 on the mandatory insurance of dwellings against earthquakes, landslides, and floods, strengthen long-term financial resilience by introducing multiyear insurance policies, property registration checks, pricing in RON, optional coverage for high seismic risk buildings without prior mandatory insurance, and policies lasting over one year. The Natural Disaster Insurance Pool (PAID) is a Romanian company made up of private insurers, which provide the mandatory Natural Disaster Insurance Policy (PAD) covering type A dwellings up to €20,000, and Type B up to €10,000. The PAD serves as a prerequisite for obtaining facultative (optional) insurance policies, which can provide more comprehensive coverage.

The existing mandatory catastrophe insurance for households faces limitations due to low penetration and reduced enforcement, particularly in rural

[93] Cristescu, George-Andrei. 2023. "The Truth. 51 Million Lei for the Rehabilitation of 16 Buildings Affected by the Earthquake in Gorj County." *Adevărul*, February 22, 2023. Link.

areas, with limited options to fully cover the actual cost of earthquake damages. PAD amounts that are unlikely to fully compensate for real damage in the event of a serious disaster, however, additional optional policies have the potential to bridge the gap between the limited PAD coverage and the true cost of reconstruction or repair, offering households better financial protection overall. However, in Romania, the available products—whether under the state-mandated PAD or facultative policies offered by private insurers or banks—appear to apply only to individual apartments or units within those buildings, leaving the structural damages of the multistory buildings or blocks of flats superstructure sustained during an earthquake uncovered.[94] Finally, the responsibility for enforcing the mandatory home insurance requirement in Romania is delegated to local public authorities, rather than being linked to the banking sector or utility access (e.g., Turkey's TCIP-like scheme where no utilities, mortgages, or property sales are allowed without valid insurance), as seen in other countries, which might decrease its effectiveness.

Despite recent improvements, Romania's insurance coverage remains well below the EU average, with only 20 percent of homes insured and enforcement left to local authorities—while just 1 in 10 Romanians are financially prepared for a disaster. Romania's insurance penetration is at 1.35 percent of GDP and insurance density at €220 per capita[95], both showing positive trends over the last three years, yet still falling short of the European averages of 7.4 percent and nearly €2,100 per capita, respectively.[96] Although 80 percent of people are aware that natural disaster insurance is legally required, only 20 percent of homes are covered, with Bucharest (38 percent) and Ilfov (36 percent) being the most insured counties.[97] Additionally, public confidence has also been weakened by recent insurer collapses, raising the need for potential public intervention to restore trust.[98] Claims accounted for over 85 percent of total payouts, reflecting a 44 percent increase from the previous year, highlighting the growing importance of obtaining optional insurance, especially as only 1 in 10 Romanians are financially prepared for a disaster.[99]

Earthquake recovery framework

Romania has not yet established a post-earthquake recovery framework, and this phase is mostly absent from national and local emergency plans, with significant uncertainty surrounding roles, responsibilities, capacities, and standards. Fragmented information exists, such as MDPWA regulations on post-disaster responsibilities and GD No. 557 on the Management of Emergency Situations including natural disasters like earthquakes. However, GD No. 557 fails to clearly define recovery-phase roles, leaving public authorities under MDPWA's jurisdiction within the public administration sphere, yet the ministry has no actual control over city halls and other local structures post-earthquake. Although gaps in the framework can be noted, it is essential to build on existing plans and legislation, streamlining information and supplementing with more operational and comprehensive details, while also identifying the key stakeholders, ensure their ownership of the process, and secure sources of funding to address them effectively.

Additionally, while the National Post-Earthquake Response Concept outlines the response sequence including recovery and reconstruction, it provides only brief guidance on recovery and lacks clear definitions of roles, responsibilities, funding, coordination, and procedures. The plan is structured around three phases for a major impact seismic event, as follows: Phase 1 – Immediate reaction (T0 to 72 hours post-event), Phase 2 – Stabilization (T+3 days to T+15 days post-event), which involves ensuring access to drinking water, food, hygiene and sanitation conditions, emergency collective shelters, medical services, protection of

[94] The desk research did not reveal any evidence of insurance coverage available for the superstructure of multistory buildings or blocks of flats in Romania. The available products—whether under the state-mandated PAD or facultative policies offered by private insurers or banks do not explicitly mention the possibility of this type of insurance.

[95] For the purpose of this paper, and based on data from the Romanian insurance entity UNSAR, the terms are used as follows: insurance density refers to the average annual insurance premiums paid per capita, while insurance penetration indicates the proportion of properties or individuals covered by insurance policies. See UNSAR. 2024a.

[96] UNSAR. 2024a. "Editorial with Alexandru Ciuncan – President of UNSAR: 30 Years in the 'Insurance World'." Link.

[97] A study by the Romanian Institute for Evaluation and Strategy commissioned by UNSAR provides insights into the landscape of home insurance in Romania for 2023, revealing that major risks, particularly earthquakes and fires, are of primary concern for Romanians. While 70 percent express interest in home insurance, only 10 percent feel financially prepared for potential disasters affecting their homes. The study also notes the importance of educating the population about the benefits of home insurance to translate knowledge into action. Asiguropedia. 2023. *Home Insurance in Romania 2023: Trends and Perceptions*. Link.

[98] Optional insurance can only be purchased in Romania if a property is already covered by the mandatory PAD.

[99] UNSAR. 2024b. "Home Insurance: Paid Claims Increase by 63%." Link.

vulnerable persons, and continuation of restoring essential public utilities, and Phase 3 – Gradual recovery (after 15 days post-event), ensuring the continuity of Phase 2 actions and progressive return to a provisional state of normality. It also very briefly mentions needs varying from day 1 to day 200 post-disaster for the remediation of essential public utilities—such as water supply, gas, communications, healthcare, sanitation, heating, electricity, and transport—as well as critical infrastructure (e.g., roads, bridges, airstrips, ports, and railways). This plan should be integrated with information from the MDPWA regulations on post-disaster responsibilities and GD No. 557 on the Management of Emergency Situations, and should include more detailed and operational procedures to ensure effective coordination and implementation, including information on post-disaster debris management preparedness, for example, which is currently missing from Bucharest's plans.

KEY OPPORTUNITIES

Romania has scope for enhancing seismic recovery and reconstruction through three key opportunities: (1) finalizing the damage and loss methodology and establishing a system, (2) developing a seismic/disaster recovery framework integrating BBB principles for reconstruction, and (3) improving existing disaster risk financing and insurance (DRFI) arrangements by considering the creation of a disaster financing strategy while also promoting the uptake of public and private insurance.

Finalizing the damage and loss methodology and establishing a system

There is also scope for Romania to enhance the efforts under way toward standardized damage assessment databases and processes, finalize and pilot the multi-method loss assessment approach currently coordinated by GIES, among others by working with private insurance stakeholders to define a realistic asset valuation model beyond PAID's limits, and transpose the methodology into a digital platform for real-time field data entry and automated valuation. A distinction between damages and losses should also be officially clarified, updating the relevant legislation.

Developing an earthquake recovery framework integrating 'BBB' principles for reconstruction

Romania has a strategic opportunity to develop a comprehensive post-earthquake recovery framework that aligns roles, responsibilities, procedures, and funding across all levels of government, private sector and civil society, and lay the foundation for an integrated, multi-hazard national disaster recovery framework/plan. There is an opportunity to create a comprehensive post-earthquake recovery framework, by updating current legislation (such as GD No. 557 to clearly define the roles and responsibilities of entities in the recovery phase, listing local authorities (also referred to as public administration) as a distinct entity rather than being grouped under MDPWA. In parallel, the current matrix of the National Post-Earthquake Response Concept should be restructured and expanded to include clearer definitions of roles, responsibilities, funding mechanisms, and operational procedures. This would support a more coordinated and effective recovery and reconstruction process by identifying key stakeholders from at all levels including public authorities, private sector and civil society, strengthening their ownership, promoting inter-institutional and inter-ministerial collaboration, aligning mandates, and securing dedicated funding sources to enable timely and effective action. BBB principles should also be integrated into post-disaster reconstruction, shifting from merely restoring damaged elements to enhancing resilience and infrastructure functionality to minimize future disaster impacts.[100]

Over time, this revised post-earthquake recovery and reconstruction framework could be integrated with other hazard-specific recovery plans into a single, overarching, multi-hazard national recovery framework/plan tailored to Romania's context. To this end, enhancing the institutional framework to establish a functional, up-to-date communication system should also be a priority for recovery efforts. This should build on improving damage assessment processes and creating protocols and agreements with key stakeholders, such as the private sector, to ensure effective collaboration in disaster response, recovery, and reconstruction.[101]

[100] GoR 2024.
[101] GoR 2024.

Improving existing DRFI arrangements

Romania needs to reduce seismic risk exposure in both the private and public sectors, address difficulties in securing funding, including by accessing technical tools, and tackle the limited technical capacity of administrative staff while also encouraging insurance uptake for households and public assets and considering sovereign-level financial tools like contingent financing and catastrophe bonds to support quick response and recovery.[102] There is scope for promoting the use of dedicated ex ante financial instruments, considering the development of a DRFI strategy, and continuing to integrate and develop sustainable financing solutions for multi-hazard resilience, including seismic. The GoR, through MoF and supported by MDPWA, has the opportunity to ensure seismic risk along with other major risks is integrated into annual and medium-term budget strategies while also reviewing the adequacy of state reserves, current mechanisms, and public insurance systems. Developing a cross-sectoral national disaster financing strategy is essential to ensure the efficient use of national and external funds through unified monitoring, avoiding double financing, and strategically prioritizing investments at all levels—national, regional, and local—including for underrepresented hazards like earthquakes and landslides, as well as for prevention, preparedness, recovery, and the protection of cultural heritage. Additionally, enhancing the capacity of public authorities to understand and utilize available funds is crucial for the planning, monitoring, and implementation of DRR investments, as well as for the sustainability and efficiency of projects. A centralized database and monitoring mechanism can enhance transparency in fund utilization and dissemination of funding opportunities.

Boosting insurance uptake in Romania requires financial education and streamlined claims processes and increased engagement of local authorities. To this end, PAID is looking to increase penetration using awareness programs with a target of 40 percent over the next five years,[103] such as the upcoming PAD Caravan campaign[104] initiated by the Financial Supervisory Authority (*Autoritatea de Supraveghere Financiară,* ASF) to inform communities about the importance of insurance as a safety net during disasters. Moreover, significant changes to the mandatory home insurance law (PAD policy), through Law No. 115 effective November 12, 2023, present additional opportunities to enhance mandatory home insurance uptake and community engagement by having local authorities inform citizens about mandatory insurance requirements, while fines for uninsured properties can be directed to local budgets, providing municipalities with additional resources.[105] Operating procedures conducted by local authorities (mayors) to file claims for state compensation should also be fine-tuned as a complementary step.

This could be complemented by offering strong incentives for key stakeholders and developing additional insurance products. Therefore, Romania could enhance the enforcement of the existing PAD requirement by adopting a TCIP-style model, which ties insurance uptake to access to utilities (electricity, water), property transactions, or mortgage eligibility — mechanisms that proved effective in Turkey. Promoting new market-based insurance solutions that will cover actual damage costs, such as introducing structural insurance for entire buildings through homeowners' associations (HOAs) or building managers, following relevant international best practices, would constitute a priority by learning from the neighboring countries experience (i.e., Turkey). This type of arrangement could potentially be included in building fees currently being collected, such as those covering capital repair and maintenance costs, thereby enhancing both risk coverage and financial resilience. Finally, instead of flat-rate pricing (up to €20,000 Type A dwellings and up to €10,000 for Type B), Romania could move toward a model where premiums vary depending on more dynamic factors (such as seismic risk zone, soil type, building age, and structural integrity), which would incentivize property owners to invest in seismic strengthening, and reflects the true risk profile more accurately, where safer, retrofitted buildings in lower-risk areas would pay less, while higher-risk properties would pay more — encouraging insurance uptake and resilience.

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[102] See "Resilience to Natural Hazards and Climate Change Is Low" in World Bank, 2023.

[103] World Bank 2024.

[104] PAID. 2024. *15 Years of Financial Protection for Insured Homes.* Link.

[105] CECCAR Business Magazine. 2023. "PAID Director - Amendments to the PAD Law Come into Effect on November 12: Their Impact Can Be Analyzed in 2025." Link.

CROSS-CUTTING TOPICS: SOCIAL RESILIENCE AND PRIVATE SECTOR ENGAGEMENT

Social resilience, social protection, and inclusion

This section covers social resilience, social protection, and inclusion in the context of earthquakes. Recognizing current operational and legislative gaps, it proposes ways to address the disproportionate impact of disasters on vulnerable populations, including through developing an adaptive social protection system. Special focus is put on PwDs by proposing tailored solutions and adapting general measures to place them at the center of DRM at all stages, emphasizing preparedness and response.

CURRENT ARRANGEMENTS

Disasters disproportionately affect vulnerable populations, particularly in Romania's rural and peripheral areas, exacerbating poverty, thus pointing to the need to ensure quality and inclusive preparedness and response services. Romania is home to people with a range of vulnerabilities, including 900,000 PwDs,[106] an aging population, people with chronic diseases, victims of domestic violence or human trafficking, people addicted to drugs and alcohol, people living in isolated communities, homeless people, and other groups. Despite economic growth and income convergence with the EU average over the last two decades, Romania has the highest poverty rate in the EU, experiencing severe regional disparities, particularly in rural regions, where poverty, restricted access to services, and underdevelopment persist. Socioeconomic inequalities are visible across population groups, with the self-employed, single, elderly, rural, and Roma people at the highest risk of poverty, especially those belonging to multiple vulnerable groups. Disasters exacerbate vulnerabilities, increase gender inequality, and raise the risk of GBV, particularly for women and children; Romania already has high rates of GBV,[107] physical and/or sexual violence, and harassment of women.

Despite progress and greater visibility and attention given to social resilience in the current NDRRS, several challenges remain. This strategy establishes for the first time a strategic framework that allows for the correlation and integration of actions undertaken in specific sectors, systematically addressing cross-sectoral issues such as social resilience and social protection and involving various stakeholders in accordance with a participatory and whole-of-society approach. In addition, sectoral strategies such as the National Strategy on the Rights of Persons with Disabilities (2022–2027) include a specific section on reducing vulnerability to risk situations and humanitarian emergencies, recognizing the state's importance in ensuring that PwDs have access not only to the same emergency response resources available to the general population but also to special intervention resources created for their needs. Based on the findings of the Diagnosis of the Situation of Persons with Disabilities in Romania conducted by the World Bank in 2021,[108] the strategy indicates that gaps remain in emergency response plans, risk mapping, access to services, and trained personnel to adequately support these groups during disasters.

In addition, the social protection system is not well placed to adapt to disasters and climate-induced shocks, lacking the capacity to integrate data on poverty and natural disasters to identify vulnerabilities. Coordination between the DRM sector and the social protection system could be improved through several actions, including the creation of early-action trigger disbursement mechanisms to support communities in case of need and improvement of the coverage and interoperability of existing social protection databases, enhancing disaster response effectiveness. The lack of a registry for vulnerable individuals hinders effective disaster response. Establishing such a registry would improve the identification and assistance of those in need, leading to more targeted and efficient emergency services.

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[106] According to ANPDPD, as of June 30, 2024, Romania had a total of 942,889 PwDs, with 98.34 percent (927,275 individuals) living independently or with their families, and 1.66 percent (15,614 individuals) residing in public residential social assistance institutions. Link.

[107] Per police records of acts of violence, a total of 51,222 victims of violence were identified in Romania in 2021, 33,970 of them women. Băluţă, Ionela, and Claudiu Tufiş. 2022. *Gender Violence Barometer 2022—Violence against Women in Romania: Representations, Perceptions*. Link.

[108] World Bank. 2021a. *Diagnosis of the Situation of Persons with Disabilities in Romania*. Link.

KEY OPPORTUNITIES

Romania has built momentum to enhance social resilience and protection for vulnerable populations through two main opportunities: (1) boosting innovation in inclusive preparedness for both PwDs and emergency personnel and (2) developing adaptive social protection (ASP) with robust safety nets, improved data, and better coordination to support vulnerable populations during and after a seismic event.

Broadening innovative measures for increased inclusive preparedness

Romania should leverage its role as a regional leader in inclusive DRM by enhancing innovative training, solutions, and partnerships with OPDs. Building on the momentum of recent projects, the GoR has a unique opportunity to scale up nationwide training and awareness, particularly in disaster response and social services, to better support individuals with physical, sensory, or cognitive impairments, leading to more effective interventions and improved outcomes for vulnerable populations. Additionally, regular preparedness activities and drills involving vulnerable populations will help familiarize them with emergency procedures and identify safety barriers. A comprehensive registry should be developed to track individuals with specific needs, ensuring timely assistance. Inclusive communication strategies and platforms must be employed to provide critical information in accessible formats. Establishing community-based support networks and partnerships will facilitate coordinated efforts while increasing funding opportunities, including PPPs, and establishing formal frameworks for disaster response involving civil society could improve resilience.

Developing an ASP system

To enhance the inclusivity and effectiveness of the DRM system in the event of an earthquake, it is crucial to integrate social benefits and ASP measures. This includes ensuring that social benefits and financial assistance programs are seamlessly incorporated into disaster response plans, offering immediate support to those affected. Developing ASP systems that can quickly adjust to the needs of different vulnerable groups, such as targeted cash transfers or subsidies, is essential for addressing their specific challenges. Strengthening social safety nets, including insurance schemes and emergency grants, will provide robust support and ensure that vulnerable populations receive the necessary assistance during and after an earthquake. Expanding access to emergency support services, including mental health counseling and specialized care, will further support individuals with various needs. Involving representatives from vulnerable populations in policy development ensures their needs are considered, while improved data collection on the social impacts of disasters can tailor protection responses more effectively.

PRIVATE SECTOR ENGAGEMENT

This section covers private sector involvement in the context of earthquake risk management. Relevant stakeholders might include building owners and property managers, insurance companies, business owners, utility providers, construction and engineering firms, CSOs, and non-profits.

CURRENT ARRANGEMENTS

The private sector, especially small and medium enterprises (SMEs), is highly vulnerable to the impacts of disasters such as earthquakes, floods, landslides, and wildfires. Consultations during the diagnostic phase of the NDRRS revealed that most CSOs and private companies have never participated in or supported disaster preparedness, risk reduction, or response planning activities in their local communities. Moreover, a diagnostic analysis of the DRM framework revealed that about two-thirds of companies, particularly in and around Bucharest, have limited understanding of the potential impacts of disasters. Although there are efforts to engage the business community, such as forming programs for business continuity planning, comprehensive strategies are still lacking. The private sector's involvement is not yet fully integrated into national and local efforts. Existing frameworks, such as the legal structure for chambers of commerce, are not tailored to address multi-hazard risks or enhance business resilience effectively.[109] Many Romanian companies face significant challenges in recovering from such events and are inadequately prepared for climate-related, pandemic, or human-induced stress factors. The adoption of business continuity plans (BCPs) is not widespread among SMEs, which also rely on highly exposed supply chains.[110] A public sector area that affects the resilience of the private sector is the Romanian health care system, which consists of both public hospitals and a wide network of privately owned and operated health clinics. Currently, the International Finance Corporation (IFC) is investing in real estate, with a focus on strengthening and enhancing sustainability, particularly in commercial, logistic, and office buildings (with respective green certifications, and requiring business continuity insurance policies), and preparing several PPP projects in the health sector to enable relocations of existing services to modern hospitals. Therefore, limited risk understanding, insufficient accessible information and disaster continuity plans, particularly among SMEs, with minimal involvement from chambers of commerce and no national platform for best practices, remain areas of potential improvement.

Private disaster insurance market

In Romania, the disaster insurance market is managed by PAID, a PPP insurance/reinsurance company created through the association of insurers with state guarantees and enforcement authorized to cover catastrophe risks, including earthquakes. PAID offers mandatory insurance for natural disasters under Law No. 260/2008. Additionally, companies under UNSAR offer optional policies but only for homes already insured by the mandatory policy. The private insurance sector is regulated by ASF, while the responsibility for enforcing the mandatory home insurance requirement in Romania is delegated to local public authorities. Overall, the home insurance market (both mandatory and voluntary) saw a 22 percent increase in premiums and a 14 percent increase in new contracts in 2023.[111] According to PAID, as of July 2024, national coverage has surpassed 23 percent, reaching a historical high, with over 30 percent of urban homes now covered by mandatory insurance and no county having coverage below 10 percent.

Despite its growth, Romania's insurance system faces challenges, including low public awareness, limited insurance coverage, particularly among SMEs, and a shortage of tailored products for high-risk

[109] GoR 2024.
[110] GoR 2024.
[111] Financial Supervisory Authority ASF). 2023. "Market Evolution of Insurance in 2023." Link.

areas. Moreover, despite an ascending trend in recent years, insurance penetration in Romania remains below the European averages of 7.4 percent and €2,100 per capita, placing pressure on the government to cover all uninsured households in case of a disaster. Rising reinsurance costs due to increased catastrophe losses have pressured insurers like PAID, leading to higher payouts and requests for premium rate adjustments to maintain financial stability.

KEY OPPORTUNITIES

Two main opportunities exist for Romania to strengthen the resilience of the private sector to disasters/earthquakes: (1) improving private sector resilience through incentives for increasing insurance penetration, strengthening BCPs legislation, and risk communication and (2) strengthening partnerships between authorities, the private sector, and civil society to increase capacity on both sides at all stages in DRM.

Enhancing private sector resilience through BCPs, risk communication, and improved financial tools

There is substantial potential for the GoR to enhance the resilience of private companies and SMEs by increasing insurance penetration, supporting the development of additional insurance products, developing green financing, improving financial inclusion, and enhancing business continuity legislation. Key stakeholders beyond private companies include employer associations, chambers of commerce, commercial and professional societies, and tourism organizations, all of which can contribute to resilience efforts and preparedness. Updating legislative frameworks and integrating risk considerations into business practices are crucial steps. In addition, enhancing private sector involvement in risk communication can increase awareness and leverage insights from Romanian companies and SMEs on how disasters impact economic activities and supply chains, thereby improving disaster response and recovery strategies.[112]

Regarding the insurance uptake within the business community, financial incentives, such as tax deductions or subsidies, could encourage SMEs to invest in insurance coverage, particularly for natural disaster risks, complemented by awareness campaigns to increase understanding of existing and new insurance opportunities. Tailored products for SMEs could be developed in collaboration with insurance companies, especially in high-risk areas, while establishing a centralized database for public-private contracts and best practices could further foster better coordination and transparency. Finally, there is also scope for operationalizing the Investment and Development Bank[113] established at the end of 2023 through Romania's NRRP, aiming to serve as the country's central development institution, supporting innovative and sustainable projects to modernize infrastructure, stimulate economic growth, and open new opportunities for entrepreneurs, investors, and local communities, which is also expected to eventually offer green financing and financial inclusion.

Strengthening collaboration between public authorities, the private sector, and civil society at all stages in DRM

Strengthening disaster response training, enhancing private sector involvement in risk communication, and developing partnerships with volunteers, CSOs, and the private sector in areas of preparedness, response, recovery, and resilient reconstruction are critical. Enhancing coordination and raising awareness among CSOs and the private sector about existing DRR plans is crucial. Improvements can be made in planning, operational arrangements, and engaging institutional actors at both central and local levels with volunteers, CSOs, and the private sector to expand support to other groups and ensure additional capacity. Targeted training and equipment should be provided to enable contributions from volunteers and CSOs. The private sector can significantly enhance cross-sectoral resilience practices by establishing formal agreements with the government to mobilize additional resources for DRR and supporting DRR community initiatives through corporate social responsibility (CSR) mechanisms. Additionally, the private sector could also contribute with the rapid provision of machinery, data, and expertise during disaster response and reconstruction phases, as well as to increase resilience in critical industries and to implement mixed-finance DRR initiatives.[114]

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[112] GoR 2024.

[113] Ministry of Finance. 2023. "Press Release - The Establishment of the Investment and Development Bank, Approved by the Government of Romania." Link.

[114] GoR 2024.

INVESTMENT NEEDS AND RECOMMENDATIONS

This chapter proposes key priorities for reforms and investment areas, which may be considered as part of technical assistance, policies or instruments. It is informed by desk research and consultations.

To manage and reduce earthquake risks effectively, Romania should prioritize investments at all DRM stages, comprehensively targeting understanding risk, prevention, response, preparedness, and recovery. Strengthening legal frameworks, plans, and strategies for prevention, optimizing staffing and technical capacity across all levels and hazards according to risk level, and improving coordination between central and local authorities, CSOs, and stakeholders should be a priority. Sufficient financial coverage should be ensured to implement these changes. Updating and integrating more dynamic risk assessment data and results into planning, including critical infrastructure and secondary hazards, is also important. This could be backed by improved capacity in public authorities to collect and use such data while also reforming building codes and improving disaster loss data management systems.

Empowering local authorities and fostering a bottom-up approach is critical. Community preparedness could be scaled up by building on existing pilot programs focusing on inclusive training and preparedness. EWSs could continue functional upgrades and improve accessibility, while EEWSs could be opened to the public with automated and digitalized solutions, in the context of adequate public awareness and training. The electronic siren system could be updated, expanded, and maintained to support post-earthquake communication. Increasing accessibility for alert systems like RO-Alert and preparedness platforms such as Be Prepared should be prioritized. Evacuation routes, shelters, and stockpiles should be mapped, accessible, well maintained, and disaster ready.

Disaster financing strategies should be developed, complemented by expanding contingent financing solutions and increasing earthquake insurance uptake to avoid overreliance on external funding. Risk financing has to go hand in hand with risk reduction efforts, as well as enhancing resilience of businesses and communities. Increasing insurance uptake and coverage is key and could be upscaled through improved awareness, the development of new public-private tailored products, and strengthened enforcement. Finally, implementing a multi-hazard recovery framework, with specific consideration for potential large-scale earthquake event(s), clarifying roles and responsibilities across all relevant plans, legislation, and frameworks, grounded in BBB principles, will support long-term resilience and recovery.

A list of recommendations is provided in Table 4, with more information per key topic under the table.

Table 4. Key investment recommendations for Romania in earthquake risk management

Governance	Develop a human resources strategy, especially for MDPWA, which is responsible for national earthquake risk management, to address the need for better coordination in managing seismic risks and optimize staffing and technical capacity across all levels and hazards according to risk level.
Understanding risk	Create a unified risk mapping methodology and standardize procedures, incorporating these into Law No. 575, along with clear definitions to distinguish between hazard and risk.
	Develop and update hazard and risk maps for all regions and levels of government.
	Develop the National Buildings Registry, secure funding for populating it, and integrate risk maps into planning processes through platforms like the National Observatory and INSPIRE, improving land use, urban planning, and emergency management documentation.
	Expand risk assessments to cover heritage structures, critical infrastructure, and secondary hazards.
	Develop tools to account for combined effects and conduct comprehensive risk assessments that address secondary hazards, such as earthquake-induced landslides and dam failures.
	Allocate resources, secure funding, and provide staff training to build capacity in public administration for risk assessment and management. Additionally, reform expert certification systems.
	Ensure funding and allocate resources for establishing data collection protocols across institutions.
Risk prevention, reduction and mitigation	Update seismic design norms like P100-1 to reflect current knowledge and best practices.
	Create new regulations for specific sectors, including the P100-8 Seismic Evaluation and Retrofitting Code for cultural heritage buildings and the P100-2 design standard for critical infrastructure such as pipes, tunnels, and bridges.
	Develop a seismic microzonation methodology and guides, allocate funding, and implement drilling/geotechnical pilot projects to enhance understanding of seismic risks.
	Amend national regulation to prohibit the occupancy of all high seismic risk public buildings (SRI and SRII) until structurally secured. Simultaneously improve public communication on retrofitting costs and processes, offer targeted financial support for vulnerable homeowners, and address banks' reluctance to finance retrofits through risk-mitigation measures and PPPs to improve access to capital.
	Expand the administrative capacity of AMCCRS to retrofit while also enforcing clear mandates for sector municipalities, supported by technical assistance and dedicated funding streams.
EEWS and public awareness	Enhance the accessibility and inclusivity of preparedness information (for example, the Be Prepared platform) and resources (for example, the DES mobile training centers).
	Allocate funds and train preparedness personnel to deliver inclusive and nationwide earthquake preparedness workshops and materials.
	Improve earthquake risk awareness in educational facilities (for example, children, teachers, and staff seismic and first aid preparedness).
	Allocate resources and equip schools with life-saving equipment (AEDs, first aid kits, and so on).
	Implement a unified seismic risk communication approach with CSOs, media, and the private sector for inclusive, targeted awareness campaigns in alignment with Chapter 14 of the NDRRS.
	Automate and open to the public the EEWS, complemented by increased preparedness activities, and tailor it for at-risk populations, integrating it with RO-Alert and the electronic sirens system for post-seismic communication.

Preparedness and response	Enhance inclusive and gender-responsive/transformative emergency training.
	Enhance response capacity and allocate funds for new technology and resources for interventions.
	Revise evacuation plans, emergency shelters, and stockpiles, ensuring they are inclusive and well-known, while developing flexible, sustainable, and mapped emergency solutions through public-private collaboration.
	Allocate funds to expand the training capacity of the NCITESM and its regional centers, enhancing training programs with modern IT tools like virtual reality and online courses to increase effectiveness and outreach.
Recovery, reconstruction, and post-disaster financing	Create a standardized methodology for collecting damage and loss data in Romania, addressing the current lack of distinction between damages and losses.
	Develop a comprehensive post-earthquake recovery framework integrating BBB principles for reconstruction that aligns roles, responsibilities, procedures, and funding across all levels of government, private sector, and civil society, and lay the foundation for an integrated, multi-hazard national disaster recovery framework/plan.
	Develop a national disaster financing strategy that integrates risk assessments and establishes post-disaster funding instruments.
	Establish a centralized database and monitoring mechanism for private and public, national, and international DRR investments.
	Develop a methodology for assessing the economic and macroeconomic impact of implemented DRR measures.
	Enhance the capacity of public authorities to understand and utilize available funds to support the planning, monitoring, and implementation of DRR investments, including through online training.
	Establish strong incentives for acquiring mandatory disaster/earthquake insurance (prioritizing households, the private sector, and high-risk industries), develop new insurance products (such as multistory residential buildings superstructure insurance through HOAs), encourage private market solutions, and allocate funds for awareness campaigns to promote them and increase coverage
Social resilience, social protection and inclusion	Update intervention procedures to accommodate the diverse communication and functional needs of various groups.
	Develop inclusive training and communication initiatives for the population.
	Enhance the accessibility of emergency facilities and services (such as assessing the 113-emergency number's effectiveness, establishing a national registry for vulnerable populations, and ensuring accessible emergency shelters, transportation, and health care).
	Improve social protection in disasters by strengthening safety nets (for example, insurance schemes and emergency grants) and creating an ASP system, starting from conducting a stress test of the social protection system to evaluate its adaptability to shocks and an analysis of marginalized groups' resilience in earthquake scenarios.
Private sector	Strengthen private sector resilience through BCPs and PPPs to develop DRM strategies (for example, training and guidelines for BCPs, creating a centralized national database for contracts, tailored insurance products for SMEs in high-risk areas, and financial incentives for insurance uptake, such as tax deductions or subsidies).

Governance and institutional collaboration: Develop a human resources strategy, particularly for MDPWA, which is responsible for national earthquake risk management, to address the need for better coordination in managing seismic risks and optimize staffing and technical capacity across all levels and hazards according to risk level. Strengthen capacity in public administration for risk assessment and management, while reforming expert certification systems. Key investment opportunities include training programs, capacity-building initiatives, and certification systems, as well as technologies and services that support risk management and assessment in public administration.

Risk assessment, planning, and data management: Update Law No. 575 and improve risk assessments to cover all regions, heritage buildings, critical infrastructure, and secondary hazards. Continue strengthening planning by integrating risk assessments at local and county levels. Update and standardize how disaster loss data are collected and shared, and improve building codes and norms to align with European standards. Key investment recommendations include digital resources such as the National Building Registry and resources needed to populate and expand the registry, risk assessment tools, mapping technologies, and infrastructure projects that align with improved territorial planning practices, data collection systems, GIS technology, and platforms for data sharing, expertise services for drafting reform documentation, compliance solutions, training, and certification for the updated standards.

Community preparedness and EEWSs: Strengthen earthquake community preparedness through inclusive practices and accessible emergency facilities and services, create an ASP system, expand the capacity of authorities to prepare and engage communities inclusively, and upgrade EEWSs to improve functionality, expand coverage, and ensure public access. Key investment recommendations include inclusive training, life-saving tools (for example, AEDs, first aid kits for schools and communities), updated risk awareness resources (for example, mobile training centers), modern digital platforms like the 'Be Prepared' platform, online tools for community education, stress test of the social protection system, infrastructure for electronic sirens, tailored alert systems for vulnerable groups, including PwDs, and enhanced communication devices to increase early warning effectiveness.

Emergency response capacity: Strengthen emergency response capacity, including volunteers and CSOs, while also engaging with the private sector in a meaningful way. Evacuation routes, shelters, and stockpiles must be mapped, accessible, well-maintained, and available at all times. Key investment opportunities include training, technology, infrastructure, equipment, e-learning platforms to enhance accessibility and scalability of training programs, national IT collaborative platforms for cooperation at all stages, national incentives to attract young people to the volunteer system, digital solutions, PPPs, and other solutions for establishing and mapping stockpiles.

Disaster financing and insurance: Reform DRFI in Romania by developing a comprehensive disaster financing strategy, including for earthquakes, and improving the mandatory earthquake insurance system to boost uptake among households, businesses, and high-risk sectors through increased awareness, improved enforcement, and the development of new products. Key investment recommendations include centralized funding databases, online training for public authorities, financial instruments, tailored insurance products, awareness and marketing campaigns, digital platforms, training and guidelines for BCPs, PPPs, and data-driven technologies to support implementation, streamline claim processes, and enhance customer engagement.

Recovery framework and reconstruction: Create a multi-hazard recovery framework, incorporating seismic risk and integrating BBB guidelines for reconstruction, thus laying the foundation for an integrated, multi-hazard national disaster recovery framework/plan. Key investment recommendations include recovery planning tools, capacity building for administrative personnel, and services focused on resilient reconstruction and multi-hazard risk management.

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