

Romania

Systematic Country Diagnostic

BACKGROUND NOTE

Climate and Disaster Management

June 2018

Acknowledgments

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Romania's Disaster and Climate Risk Profile

Overview

1. **Romania is severely exposed to a range of natural disasters—in particular, to earthquakes and floods—resulting in substantial social, physical, and financial impacts across the country.** Since 1990, 77 severe disaster events¹ were recorded in Romania, including 44 floods, 15 extreme temperature events, 7 storms, 2 earthquakes, 1 drought and 1 landslide, resulting in more than US\$3.5 billion of direct damage.² Over the last 100 years, 13 earthquakes resulted in 2,630 fatalities and affected more than 400,000 people, with damages from the 1977 earthquake alone exceeding US\$2 billion. At the same time, the potential impact of natural disasters is increasing because of: (i) the increasing exposure of people and economic assets; (ii) insufficient funding for risk reduction; and (iii) the effects of climate change.

2. **Romania is already experiencing the impacts of climate change, including increased floods and droughts in the last two decades.** Impacts from this phenomenon include the increased incidence of severe inland and coastal flooding; the increased intensity and frequency of drought; and an increased risk of soil erosion and desertification. Romania's climate is predicted to change considerably over the next 50–100 years. Increases in air temperatures vary among climate models, but increases in the annual average temperature are expected to be in the range of +0.5°C–1.5°C by 2029; and +2.0°C–5.0°C by 2099, depending on the global climate scenario used. The total amount of annual precipitation is projected to decrease by 10 percent to 20 percent, depending on climate model scenarios and geography within Romania, by the end of the century. Precipitation patterns are also expected to become more irregular, and the frequency of shorter, more intense, localized rainfall events will become more common.³

Geophysical hazards

3. **Romania is one of the countries most at risk from earthquakes in the EU,** with hundreds of lives lost and tens of thousands of buildings damaged in earthquakes in the last 200 years.⁴ **In the last five centuries, there have been, on average, two magnitude 7+ earthquakes each century, with five earthquakes since 1802 with magnitudes higher than 7.5.**⁵ At a global level, among the 10 countries ranked with the highest amount of built-up surface potentially exposed to seismic hazard, two European countries emerge: Italy and Romania, with 84 percent and 92 percent respectively, of built-up surfaces in

¹ To be classified as a disaster, it must conform to at least one of the following criteria: 10 or more dead, 100 or more affected, declaration of state of emergency and/or call for international assistance (EM-DAT).

² EM-DAT 1900-2017

³ <http://globalpractices.worldbank.org/climate/Pages/CountryBriefs/Romania.aspx> and https://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/6th_nccc_and_1st_br_of_romania%5B1%5D.pdf

⁴ Vulnerability to seismic risk is due to Romania's geographical location on the Vrancea subduction zone. Proximity to the fault and poor soils mean that Bucharest is among Europe's capital city with the highest disaster risk and one of the 10 most vulnerable cities to seismic risks in the world.

⁵ Romania National Institute for Earth Physics Earthquake Catalogue.

hazard zones.⁶ The vulnerability of the Romanian economy to earthquakes alone is further exacerbated by:

- >75 percent of the population (65 percent of urban population) and 45 percent of all national lifelines⁷ are in areas with high earthquake hazard⁸
- 60–75 percent of fixed assets, and 70–80 percent of GDP, are produced in earthquake prone areas.

4. **Bucharest is the most earthquake-prone capital city in the EU because of its proximity to the Vrancea earthquake zone,⁹ which is capable of producing earthquakes as high as magnitude 8.1.**¹⁰ For example, the 1802 Vrancea earthquake, with a magnitude of 7.9 is one of the largest earthquakes on record to occur in Europe, with shaking felt as far as St Petersburg, Russia. One of Romania's most powerful recent earthquakes took place in 1977. Measuring 7.2 on the Richter scale, it caused more than 1,500 fatalities, left 11,321 injured, and collapsed or severely damaged 156,000 residential apartments. More than about 2,000 schools were damaged, and 274 completely collapsed. Of hospitals and polyclinics, 448 were damaged, and 11 hospitals collapsed. In 1978, a World Bank report estimated a total damage of US\$2 billion,¹¹ with Bucharest accounting for 70 percent of the total damage (about US\$1.4 billion). The 1977 earthquake contributed extensively to the serious economic crisis that began in Romania in 1979 and lasted even after 1989.

5. **Scientists and engineers calculated that a similar event today would have direct damage costs of €7-11Bn (out of which €5 billion would be uninsured losses¹²), with economic losses exceeding €25 Bn.** Estimates of lives lost range from 700 to 4,500, with 250,000 people estimated to be homeless for months and years. According to UNSAR, the Romanian insurer's professional body, more than 80 percent of affected families will not have the necessary resources to repair or to rebuild after an earthquake similar to the 1977 event.¹³ Modelling by the Technical Construction University of Bucharest estimates that a magnitude 7.5 Vrancea earthquake would immediately reduce the functionality and access to housing in Bucharest to 30 percent, with functionality only rising to 65 percent after a year, and 90 percent after two years. Although the potential for an earthquake event is not affected by climate change, urbanization and the increased concentration of economic assets, and population growth in earthquake prone areas such as Bucharest, mean that the risk will continue to grow through time—doubling by 2080—unless urgent action is taken to reduce earthquake risks. Today, one-quarter of the Romanian population has not experienced an earthquake with a magnitude ≥ 6 , and more than 40 percent were born after the devastating 1977 event, so there is limited memory and thus limited focus on the potential risks.

⁶Atlas of the Human Planet 2017: Global Exposure to Natural Hazards - <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/atlas-human-planet-2017-global-exposure-natural-hazards>

⁷ Critical transport, energy, water, communication etc.

⁸ https://www.igsu.ro/documente/RO-RISK/Raport_Final_de_tara.pdf

⁹ Iuliana Armaş et al. "Vulnerability to Earthquake Hazard: Bucharest Case Study, Romania," *International Journal of Disaster Risk Science*, Volume 8, Issue 2 (2017): 182-195.

¹⁰ Professor Radu Vacareanu (2017), Technical University of Engineering Bucharest.

¹¹ 1978 values.

¹² Romanian Insurers' Professional Body (UNSAR).

¹³ <http://insurance.1asig.ro/ICAR-2016-Main-takeaways-article-2,3,100-8505.htm>

Figure 1. Historical seismicity in Romania

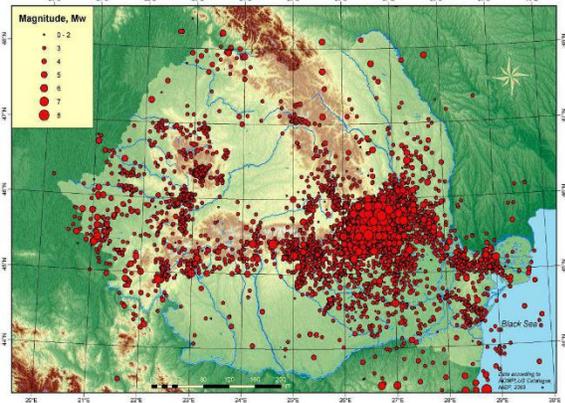
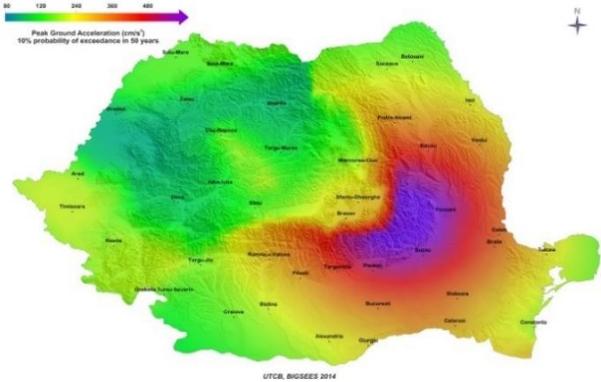


Figure 2. Most recent probabilistic seismic hazard map of Romania



Source: Technical University of Civil Engineering Bucharest

Note: The map on the right highlights the Vrancea seismic zone in purple and red.

Hydro-meteorological hazards

6. **The Carpathian Mountains in central Romania exert significant influence on the country's fresh water resources, with the topography creating or influencing weather patterns that affect water availability in the 11 water basins around the country.** The water supply is also uneven from a temporal perspective, with the heaviest rainfall occurring in the summer months. There are, however, natural variations from year to year, a situation that is expected to become more prominent as a result of climate change. There are 400 dams in Romania that capture runoff in the mountains, providing flood control protection and balancing water supply availability over the course of the year, with some dams also used to generate hydropower. Of the 125 billion cubic meters of freshwater resource available across Romania each year, approximately 93 percent is from surface sources—primarily the Danube and inland rivers—with the remaining 7 percent supplied by groundwater sources.¹⁴ Given that interior rivers are supplied primarily by snow and rainfall, Romania's water supply is highly dependent on weather systems, creating some vulnerability to extreme events and any long-term shift in meteorological patterns. This may have a disproportionate effect on certain cities and regions around Romania.¹⁵

7. **Romania is also one of the most flood-prone countries in Europe, with significant damage from floods occurring several times per decade.** More than one million hectares (ha) of land are exposed to flooding; nearly one million Romanians live in high flood risk areas; and more than 900 communities in the country are situated in high flood risk areas.¹⁶ These have significant impact, as highlighted by these recent events:

- 1970: 200 fatalities and 3 billion in damage.
- 1991: estimated damage of \$0.5 billion affecting an area of ~1,400 km², including more than 12,000 buildings, 990 km of roads, 14 km of railroads, and 150 bridges.
- 1997: estimated damage at US\$310 million.
- 1998 floods: estimated damage at US\$150 million.
- 2005: €2 billion in damage (representing 2.1 percent of Romania's GNP), affecting 656,392 ha agricultural land, 10,420 km roads, 23.8 km of railway, 9,113 bridges and foot bridges, and 90,394 contaminated wells.
- 2006: An estimated 100-year flood event resulted in economic damage of more than 1 percent from Romanian GNP. The number of affected localities was 160; the estimated number of affected homes was 10,000. About 600 km of roads and 300 bridges were damaged, and the total farmland affected was 21,000 ha.
- 2010: a high number of damaging events throughout the Danube river basin led to 35 casualties and damages of €2B¹⁷ across the Danube River basin, including €1B in Romania
- 2013: flash floods affected numerous municipalities across Romania, resulting in nine deaths, requiring the evacuation of 6,900 people, and resulting in 3,000 ha of flooded agriculture land.

¹⁴ European Environment Agency (2010). Freshwater (Romania). Viewed at:

http://www.eea.europa.eu/soer/countries/ro/soertopic_view?topic=freshwater

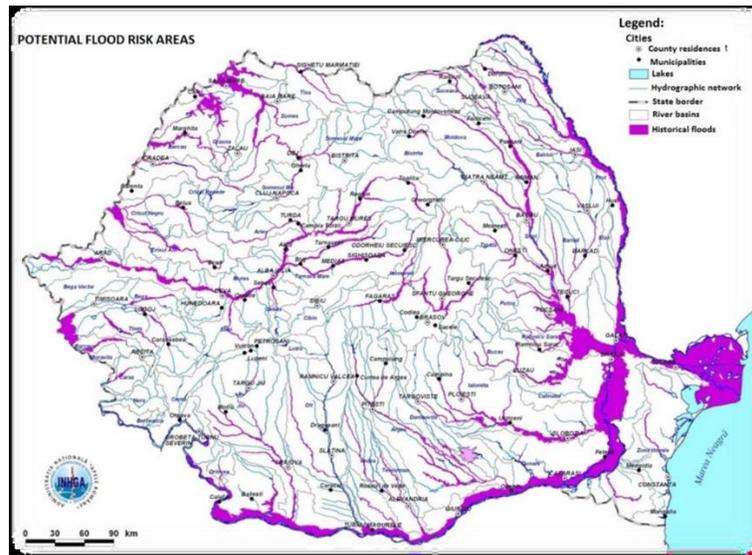
¹⁵ World Bank. *Romania: Urban Sector Rapid Assessment* (2014), Washington, DC: World Bank.

<https://openknowledge.worldbank.org/handle/10986/17573>

¹⁶ Romanian Waters National Administration (2013).

¹⁷ http://www.rowater.ro/Documente%20Externe/1stdfrmp-final_0.pdf

Figure 3. Historical flood-affected areas in Romania



Source: RO-RISK project of the Romanian General Inspectorate for Emergency Situations

8. **From 1987 to 2002, Romania had the greatest spatial extent with repeated flood events of all EU countries.**¹⁸ A 100-year flood along the Danube river would affect more than 800,000 inhabitants, 3,550 communities, 5 percent of national highways, 700 km of major roads, more than 2000 km of county and local roads, 100 nationally protected areas, and more than 300 cultural heritage buildings.¹⁹ For a 1000-year flood, more than 1.8 million inhabitants would be affected. Across Romania, flood risk to GDP is highest in Ialomita and Satu Mare, followed by Arad, Teleorman, Giurgiu and Calarasi.²⁰ Urban flood is also considered high, with urban floods resulting from inability of urban water management systems to cope with high intensity rainfall events. As the climate changes, flood events are projected to occur more frequently in many river basins, particularly in winter and spring.²¹ Flood risk modelling predicts that 50-year return period flood could affect 2 billion USD of GDP in 2015, but by 2080—considering change in socio-economic and climate conditions—this may double or even quadruple, depending on the mitigation pathway selected.

9. **Droughts have affected 48 percent of agricultural land in Romania, and estimates suggest a 20 percent chance of severe drought in the next 10 years,**²² affecting the south-western and north-eastern provinces the most, with a likely increase in the number of drought events into the future. Between 1961 and 2006, the rate of precipitation in Romania also decreased by roughly 30 mm per decade, and during the 1980–2012 period drought occurrences increased, with precipitation amounts below normal most years. Thus, the frequency of droughts increased from 1 in 10 years to 1 in 5 years. A total of eight drought months were recorded during agricultural year 2011–2012, November 2011 being the driest month in last

¹⁸ European Spatial Planning Observation Network 2004.

¹⁹ https://www.igsu.ro/documente/RO-RISK/Raport_Final_de_tara.pdf

²⁰ World Bank. *Country Risk Profiles for Floods and Earthquakes in Europe and Central Asia* (2016), Washington, DC: World Bank.

²¹ <http://globalpractices.worldbank.org/climate/Pages/CountryBriefs/Romania.aspx>

²² GFDRR: www.thinkhazard.org

52 years in Romania with a monthly mean of only 1.2 mm as against multi-annual mean of 43.9 mm. Studies reveal a 40–60 percent decline in crop yields during this time. Lower agricultural production may reduce the availability of food products in local markets and cause food inflation. This trend is expected to continue because of climate change, resulting in higher levels of water stress, especially in the summer, and potential implications for hydropower generation.

10. Analysis from 1961 to 2010 also shows a reduction in snow depth and duration in winter months, and an 82 percent reduction in snow days. However, **evidence indicates that while snowfalls are shorter, they are becoming more intense.**²³ For example, intense events, such as the 2014 blizzard—which left families without power, blocked roads, collapsed roofs, and resulted in several fatalities—may become more common.

11. **Extreme heat events are becoming more frequent as the climate warms, with the follow-on events of more intense and frequent wildfires.** Bucharest currently ranks among the 5th fastest-warming cities around the world, with an increase of +7.9°C temperature if recent emissions trends continue, and +4.2°C with moderate emission cuts.²⁴ The frequency of wildfire events has doubled, from about 175 per year between 1956 and 2005 to about 341 events per year in the last decade.²⁵ Moreover, the average area affected has increased by 25 percent in the same period. Fortunately, wildfire events typically occur in the less-populated Carpathian mountainous area, but the impact on forestry, protected areas, and the environment is still significant.

12. **Romania also faces frequent landslides in some areas**, with most events occurring in March and April, during snowmelt and spring rain overlap, and again in June and July, when heavier rainfall occurs. Increased landslide activity has also occurred following significant earthquakes. Most of the damage is related to homes and road infrastructure.

13. **Overall, the impact of climate-related hazards on critical infrastructure in Romania²⁶ indicates that expected annual damage to infrastructure alone would double by 2020, and by 2080 could be six-times higher.** Considering this history and these forecasts, it is important for any disaster risk management (DRM) and sectoral interventions in Romania to consider a range of hydro-meteorological and geophysical hazards, and how these can change in the future.

²³ Victor Birsan and Alexandru Dumitrescu. “Snow variability in Romania in connection to large scale atmospheric circulation.” *International Journal of Climatology*, Volume 34, Issue 1 (2013): 134-144. Critical infrastructure assessed under this study includes transport, energy production, industry, water supply, education and health infrastructure, and hazards included extreme heat, flood, drought, windstorms, wildfire etc.

²⁴ <http://www.climatecentral.org/news/global-cities-climate-change-21584>

²⁵ General Inspectorate for Emergency Situations. RO-RISK (2013-2016).

²⁶ Giovanni Forzieri et al. “Escalating impacts of climate extremes on critical infrastructure in Europe.” *Global Environmental Change*, Volume 48, January (2018): 97-107.

Box 1. GFDRR Resilience Indicator

The World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR) developed the Resilience Indicator¹ which highlighted that the **annual average risk to assets in Romania is 0.41 percent GDP, and the well-being risk is 0.58 percent GDP**. The indicator also enables a comparison of Romania's resilience to disasters with other similar countries. In a comparison with Poland, the following observations can be made:

- Romania faces double the risk to assets and socioeconomic activity from disasters compared with Poland.
- 70 percent of the assets of poor people¹ are vulnerable to destruction compared with 43 percent in Poland, and even the assets of non-poor in Romania have three times the vulnerability compared with Poland.
- 80 percent of the population has access to early warning in Romania, compared with 100 percent in Poland.

Considering actions that could be taken, policies aimed at reducing private asset losses—including **reducing exposure and vulnerability of assets and improving access to early warning systems—could reduce asset losses by 13 percent and well-being losses by 16 percent**. Policies aimed at increasing resilience—including access to savings, insurance, and finance, accelerating reconstruction through access to finance, and streamlined processes, post-disaster support, etc.—could reduce asset losses by 2.8 percent, and well-being losses by 14 percent.

processes, post-disaster support etc. – could reduce asset losses by 2.8% and well-being losses by 14%.

Legislative, Policy, and Institutional Framework for Disaster Risk Management and Climate Change

14. **As an EU member state and signatory to the Paris Agreement, Romania is a party to the mitigation and adaptation commitments made in the EU's collective Nationally Determined Contribution.** Romania also adopted a National Climate Change Strategy for 2013–2020 in 2013, followed by the National Climate Change and Low Carbon Green Growth Strategy for 2016–2030 and the associated Action Plan on Climate Change for 2016–2020 in 2015. Each of these documents establishes sectoral priorities for responding to climate change, including for Energy, Transport, Agriculture and Rural Development, Forests, Biodiversity, Urban Development, and Water and Waste Management.

15. **Romania adopted the Sendai Framework for Disaster Risk Reduction in 2015²⁷ which aims at substantial reduction of disaster risk and losses of lives, livelihoods, and health, and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries.** As part of this commitment, the government has been actively working to establish a National Platform for Disaster Risk Reduction.²⁸ This platform is organized and operates as a national multi-sectoral and interdisciplinary mechanism, consisting of the National Committee for Special Emergency Situations²⁹ (NCSES) members, the technical and scientific support groups and NGO representatives, the associative structures of local authorities, professional associations, trade unions, higher education institutions, and research institutes, cultural institutions of religious denominations, and associations recognized by law and mass media.

16. **The organizational setup for disaster risk management in Romania comprises a system of institutions which include central, territorial (decentralized), and local public administrations, including among others the following agencies:**

- a. **The Department for Emergency Situations (DES) and the General Inspectorate for Emergency Situations (GIES) under the Ministry of Interior have responsibility for response, preparedness, and prevention.** The DES coordinates public policy on DRM, and coordinates with other line ministries with functions under the law, such as Ministry of Regional Development and Public Administration, Ministry of Environment and Climate Change, Ministry of Agriculture and Rural Development, Ministry of Health, Ministry of Education, and Ministry of Economy. GIES is responsible for prevention and management of disasters, and operates the National Operational Center. However, specific roles and responsibility for DRM actions are also held at central, Bucharest municipality, county, and local level, with actions administered, for example, by Emergency Situation Committees or the professional community public services for emergency situations (County Inspectorates for Emergency Situations).
- b. **Ministry of Public Finance (MOPF)** is responsible for the Intervention Fund, which is designed to support expenditures associated with disasters (Law 500/2002). The size of the Intervention Fund

²⁷ <https://www.unisdr.org/we/coordinate/sendai-framework>

²⁸ A multi-sectoral National Platform for disaster risk reduction is a nationally-owned and led mechanism facilitating the interaction of key development players around the national disaster risk reduction agenda. The National Platform serves as an advocate for adopting disaster risk reduction measures at all levels.

²⁹ in Romanian: CNSSU - Comitetul Național pentru Situații Speciale de Urgență

is determined annually, and initial provisions are typically less than €4M³⁰ but can be increased if determined necessary by Parliament. Following major disasters (damage exceeding EUR3 Billion or 0.6 percent GNI), the government can also access the European Union Solidarity Fund for critical infrastructure repair, rescue, and temporary shelter, cultural heritage repairs, and debris removal and clean up.

- c. **The Ministry of Regional Development and Public Administration (MRDPA) is responsible for seismic risk reduction and the integration of disaster and climate risks in subnational urban, land use, and regional plans.** The National Program for Local Development covers infrastructure—roads, bridges, water treatment plants, schools, hospitals, and cultural buildings, and a series of smaller programs are dedicated to sports buildings. MRDPA also has responsibility for programs aimed at the reduction of seismic risk in the high-risk buildings in Bucharest, a program that has had limited success because of legislative and implementation issues. MRDPA is also seeking to devise an improved strategy to address seismic risk in multifamily residential buildings as part of its broader housing reform agenda. Finally, the MRDPA has responsibility for the strengthening of building codes against seismic risk for new and existing buildings, and has recently commissioned further upgrades. The Ministry of Regional Development also holds the responsibility to support subnational authorities for the integration of climate and disaster risk into development and urban plans.
- d. **The Ministry of Water and Forests has responsibility for implementation of, and compliance with, the EU Floods Directive** which involves: i) a preliminary assessment of flood risk in river basins and coastal zones; ii) development of flood hazard maps and flood risk maps in high risk zones; and iii) development of flood risk management plans in these zones. These plans must include measures that will reduce the potential adverse consequences of flooding for human health, the environment, cultural heritage, and economic activity, and should focus on prevention, protection, and preparedness. Romania is currently compliant with the Flood Directive, and under the flood management plans, more than EUR3.7 billion of investments in flood protection were identified.
- e. **Ministry of Environment and Climate Change (MECC)** is the authority responsible for administering the National System for Climate Change. MECC is also responsible for the estimation of GHG emissions. The National Strategy on Climate Change (2005–2007) for Romania was focused on meeting its obligations and duties on climate change, including adapting to the impact of climate change, reducing carbon intensity in the national economy, and increasing its competitiveness. This strategy was updated in the National Climate Change Strategy for 2013–2020. This strategy refers to the effects of climate change on water safety, agriculture, energy, transport, industry, insurance, biodiversity, health, tourism, forestry, infrastructure, and recreational activities.
- f. **The National Institute of Hydrology and Water Management (NIHWM) provides warnings for flood, flash flood, drought, ice, and air pollution** through daily and monthly bulletins. The National Meteorological Administration provides freely available information through its website on warnings, forecasts, and “nowcasts” as well as regional and seasonal forecasts. They also provide agrometeorological forecasts weekly, and soil moisture maps. This information is provided to a wide range of government ministries and to the Red Cross and national media. Estimates indicate that

³⁰ <http://www.orizonturi.ucdc.ro/arhiva/khe-vol9-nr2-2017/9.%20CATASTROPHIC%20RISK%20MANAGEMENT.pdf>

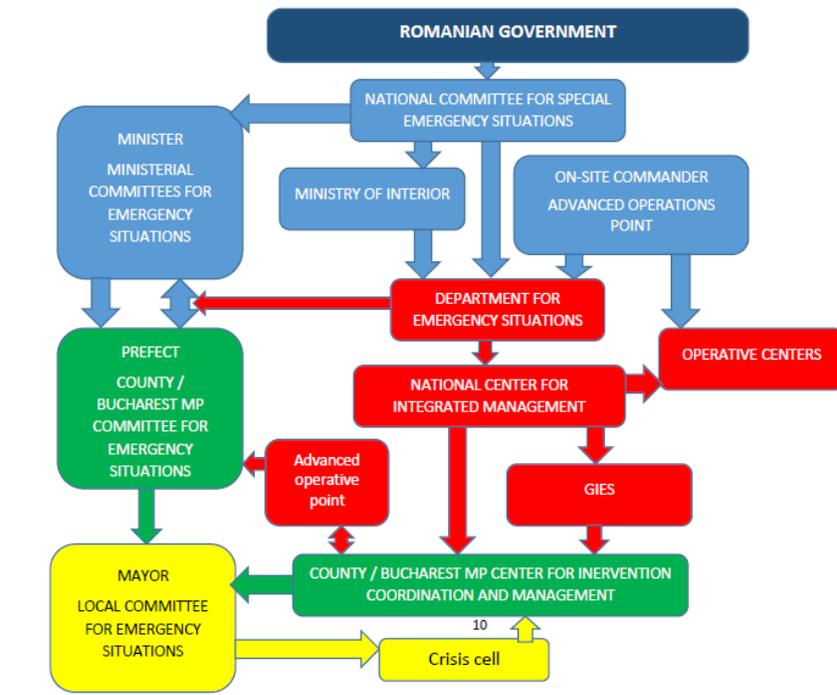
approximately 80 percent of the population is able to regularly access warnings for extreme climate events.

- g. **The National Institute for Earth Physics has a comprehensive seismic monitoring system and can automatically calculate earthquake magnitude, location, and depth for earthquakes generated within Romania within seconds.** Depending on the earthquake attributes, the Institute can provide rapid early warning to vulnerable infrastructure before most damaging earthquake waves arrive—in about 15–25 seconds. This is enough to instigate emergency procedures in the country’s nuclear power plan, a process that is already in place. This system could also enable automatic gas and electricity shut off, for example, in affected areas, reducing the chance of fire after an earthquake. While this is technically and financially feasible, processes to ensure the safety of these facilities are not yet in place, as regulations do not require action on the part of private-sector owners.

17. **In the event of a major emergency situation, a municipality, ministry or other authority can request a meeting of the National Committee for Special Emergency Situations (NCSES).**³¹ The NCSES (Figure 4) is formed with representatives of all government ministries at the minister or secretary level, including the Ministry of Interior and Ministry of Public Finance, and is chaired by the Minister of Interior. The NCSES will convene, and the Chief of the Department of Emergency Situations will report on the disaster parameters. According to government decision (GD) no. 94/2014, the NCSES will make recommendations and issue decisions with respect to government actions that should be taken to respond to the disaster event, calamity, or emergency situation related to natural, technological, biological or radiological phenomena that occurred, or the imminent threat of natural disaster. NCSES also handles health emergencies, as was the case during the Ebola crisis. The decisions are voted on by all its members, according to GD no 94/2014. The NCSES is also able to recommend a set of actions to the Government. The recommendations of the NCSES are to be provided to the Prime Minister for decision.

³¹ The NCSES is governing by Government Emergency Ordinance no. 21/ 2004 on the National Emergency Situations Management System (NESMS, in Romanian: SNMSU—Sistemul Național de Management al Situațiilor de Urgență), as subsequently amended, and its secondary legislation and supplemented by the Government Decision (GD) (Ordinance) no. 94/2014 on certain measures for emergency situation management.

Figure 4. National Committee for Special Emergency Situations



18. **Romania is in the process of strengthening legislative and organizational frameworks for disaster mitigation and preparedness.** The Romanian Disaster Management System has undergone dramatic changes, from a highly militarized and centralized system going through a process of decentralization, and a systemic reconstruction of civilian emergency based rules and regulations compatible with those of NATO and the EU.³² Since 1989, Romania has been going through a major transition with associated reorganization of the disaster management structure.³³ Romania is also making efforts to develop national and regional risk management plans to incorporate risk reduction approaches. To drive this overall process, a multi-hazard approach has been increasingly shaping how Romania manages disaster risks. Such an approach involves translating and linking knowledge of the full range of hazards into risk management strategies, assessments, and analysis, leading to greater effectiveness and cost-effectiveness. To illustrate this recent shift, Romania recently finalized an integrated national risk

³² The 1977 earthquake served as a catalyst for Romania to begin the implementation of seismic risk reduction measures, which included a strategy to develop and implement improved building codes and identify at-risk structures. A new seismic zonation of Romanian territory was elaborated. It used parameters including geological structure and plate tectonics, intensity of previous earthquakes and return periods. Another key lesson learned from this disaster was the need for a special professional civil emergency body addressing disasters and natural catastrophes both on a national and a local level. The solution was to establish the “Law no.2/1978 regarding civilian defense” to set up norms, rules and institutions both on a national and a local level to take measures in the case of natural and man-made disasters.

³³ Prior to 1989, the national government took full responsibility for the reconstruction work in the aftermath of disasters. The government mobilized military and other public/private resources via top-down directives to manage large-scale damages. All related financial consequences of large-scale disasters were managed by the state.

assessment through an EU project (RO-RISK 2013–2016), which seeks to offer a set of tools to local authorities for multi-hazard analysis that can inform sustainable land use policies.³⁴

19. **Coordination between the central ministry and the local bodies, and the involvement of other departments in disaster preparedness and risk reduction, requires further strengthening.** The Government Emergency Ordinance 21/15.04.2004 established that the national authority responsible for multi-sectoral coordination is the National Committee for Special Emergency Situations (NCSES), through the Department of Emergency Situations and the General Inspectorate for Emergency Situations (GIES). Under these acts, sectoral institutions have the responsibility to draw up plans which are then coordinated by the NCSES. Institutional capacity and resources are significant, and are designed to ensure effective response to natural, man-made, and biological disasters. Recently, GD no. 557/2016 on risk management was adopted. This act defined the obligation of authorities to draw up sectoral plans to provide specific emergency management. The coordination of the whole process is also ensured by the National Committee for Special Emergency Situations (NCSES). Despite considerable progress, Romania also faces challenges in sustaining the commitments of authorities, especially at the local levels. Even if local authorities have annual funds dedicated for disaster risk management, the funds are often redirected for other purposes.

³⁴ To enhance the understanding of the risks, in all their dimensions, the level of vulnerability, capacities and exposure of persons and assets, and characteristics of the hazards, Romania has recently completely a risk assessment process at the national level, which will represent the base of the whole process of understanding and risk awareness in order to elaborate strategies and programs for reducing and maintaining risks at an acceptable level.

Assessment of the Current Disaster Risk Management Situation

20. To assess the current situation of disaster risk management in Romania, the World Bank Group operational framework for DRM³⁵ is used both for structuring different DRM components, and also for enabling an easier comparison of progress and gaps with countries having similar risks and levels of development. In this assessment we focus on: i) Risk identification, covering hazard and risk assessments and their communication; ii) Risk reduction, including structural and nonstructural measures; iii) Preparedness through early warning systems, contingency planning, response readiness, etc.; and iv) Financial protection, which is aimed at assessing and reducing contingent liabilities and ex-ante and ex-post financing instruments. All pillars need to be underpinned by a functioning institutional, political, normative, and financial context. These elements align with the 2015 Sendai Framework for Disaster Risk Reduction priorities for action.³⁶

Risk identification

21. **The Government of Romania has recently completed a national risk assessment process known as Ro-Risk which articulated the risk from 11 natural, man-made, and pandemic hazards.**³⁷ DES and GIES are now uploading all the data and information collected under this process to a GIS system, which will ultimately link with the EU-INSPIRE standard system.³⁸ Moreover, the Ministry of Regional Development and Public Administration has recently started providing funding to subnational authorities to undertake hazard and risk mapping and analysis for urban and land use planning. DES, GIES, and other DRM partners have also recently undertaken significant and scaled up efforts to communicate the risks of natural disasters to communities and school children. This is critical, as a recent study revealed that while 63 percent of Bucharest residents believe that there is a chance of an earthquake in coming years, a surprising 29 percent of people appeared to be unaware of this risk.³⁹

22. **Through the RO-RISK project, GIES identified the following priorities to 2020, to improve preparedness, early warning, and response:** (i) developing and improving procedures, standards, regulations, and innovative tools to optimize the resources and anticipate emergency situations, in order to ensure the management of complex or unprecedented situations; (ii) improved partnership with the society in order to respond; (iii) increased effectiveness of the legal framework to improve organization and functioning of institutions and the military firefighters and volunteer statutes during an emergency; (iv) strengthened operational and response capability through new integrated technologies in the prevention, preparedness, and response; (v) centralized alarm notification—national system achieved by ensuring 100 percent coverage by 2020; (vi) addressing the insufficient coverage of methodologies, guidelines, and of an updating system for identification of drought thresholds and drought mapping, as well as methodologies; (vii) addressing the lack of prioritization and the proper methods and techniques for the rehabilitation or construction of dams, and the execution of protection work in conjunction with urban construction territorial plans, (viii) strengthening the capacity of local authorities with responsibilities in the management of emergency situations, and (ix) ensuring that GIES headquarters is

³⁵ <https://www.gfdrr.org/sites/default/files/publication/sendai-report.pdf>

³⁶ <http://www.unisdr.org/we/coordinate/sendai-framework>

³⁷ https://www.igsu.ro/documente/RO-RISK/Raport_Final_de_tara.pdf

³⁸ <https://inspire.ec.europa.eu/webarchive/index.cfm/pageid/42/list/7/id/36070.html>

³⁹ Ileana Calotescu, Florin Pavel and Radu Vacareanu. "Community seismic resilience for Bucharest, Romania: Public Survey Results." *12th International Conference on Structural Safety and Reliability* (2017).

strengthened to reduce damage and collapse hazards, and to ensure it can fully function in aftermath of disaster.

23. **Prevention and management of emergency situations occurs at the county and prefecture level, with local authorities having responsibility for local-level emergency management and prevention.** Local authorities are required to have hazard and risk maps for their territorial administrative units, but these are reportedly incomplete, inconsistent, out of date, or simply not available for some cities. The extent to which these plans account for the full array of climate impacts anticipated across Romania is unclear. Part of the challenge arises from how climate change is treated from a planning perspective—as purely an emergency response issue, or as something that can be planned for and adequately addressed over time through capital investment and policy changes.⁴⁰

24. **Significant gaps still remain**, including: (i) adoption of national standards for risk assessment and collection and sharing of disaster and climate information; (ii) national public asset databases that include transport, education, administration buildings, etc. and attributes critical for assessing risks or vulnerabilities; (iii) standardized damage assessment process to enable accurate accounting of disaster and climate change impacts; (iv) national prioritization of assets at high risk from disaster and climate change for investment planning; and (v) hazard and risk assessments that fully account for climate change, especially for riverine and flash flooding.

Risk reduction

25. This section will primarily focus on gaps in risk reduction for earthquake risk in Romania, as flood risk reduction is extensively and comprehensively covered under the EU Flood Directive, and significant EU funds are used for projects aimed at flood protection in Romania. Furthermore, a recent Romania Water Diagnostic Report extensively covered opportunities and challenges in flood and drought management.⁴¹ In particular, this report noted **an urgent need to invest in dam storage and flood protection, to reduce flood risk and increase storage for droughts**. As it currently stands, many dams are structurally unsafe, and need to be operated below their original design to ensure the safety of downstream residents.

26. **The high earthquake vulnerability of the Romania and Bucharest building stock primarily comes from buildings built before the first official seismic code in 1963.** Buildings constructed between 1964 and 1977 are also considered to have high vulnerability, as the code did not adequately consider seismic resistance. Building codes from 1978 to 2012 had moderate or good seismic resistance, so buildings constructed in this period have elements of seismic resistance, depending on the maintenance of the building and any building alterations through time. For buildings constructed following the 2013 building code for earthquake resistance⁴² and which adhere to this standard, the likelihood of severe damage or collapse in an earthquake is low. However, damage could still occur and the building may still need significant repair before reoccupation. **For residential buildings, this equates to 40 percent of apartments**

⁴⁰ World Bank. *Romania: Urban Sector Rapid Assessment* (2014).
<https://openknowledge.worldbank.org/handle/10986/17573>

⁴¹ World Bank. *Romania Water Diagnostic Report: Moving towards EU compliance, inclusion and water security* (2018).

⁴² 2013 code is compliant with Eurocode 8 for seismic resistance in buildings.

being constructed in the absence of any seismic code, and 73 percent being constructed with no code or weak code.⁴³

27. **Following the 1977 earthquake, many recommendations were made by international and local experts for a systematic evaluation of all buildings in Bucharest and in high-earthquake areas** to determine actions for earthquake strengthening—or consolidation as it is termed in Romania—and which ultimately led to changes in the building design regulations. Here we focus on two areas: the risk to private residential buildings, which has been the focus of Romania’s national and subnational government for the last several decades; and second, on the risk to public buildings providing key government services, such as schools, public administration, etc.

Housing

28. **The recent National Housing Strategy (2016)⁴⁴ highlighted Romania’s housing as among the most crowded, dilapidated, expensive, and poorly located of any country in Europe, and exposes many people to high seismic risk.** More than 35 percent of Romania’s 8.5 million housing units need urgent repairs, and more than 10,000 pre-1980 blocks have structural, roof, and heating needs. This is attributed to the absence of maintenance, management, or capital improvements, particularly in buildings with a high concentration of low-income and vulnerable populations (such as the elderly) or a mix of various income groups, where obtaining consent and contributions from the homeowners for improvements is a challenging task. Moreover, an estimated 10,577 households currently live in 607 residential buildings rated Class I— the highest—seismic risk⁴⁵. More than 60 percent of the country’s Class I risk buildings are in Bucharest: some 370 structures with 6,480 apartment units. Most dwellings in these apartment blocks are occupied. More than 2,500 residential blocks in Bucharest are unstable (in the Class I through Class III risk categories) and need structural reinforcement. According to surveys, fewer than 45 percent of people feel safe from earthquakes in the building in which they currently reside.⁴⁶

29. **The current government program for retrofitting unstable residential buildings has failed to achieve the intended goal.** The 2016 Housing Study highlighted barriers to success as: (i) lack of adequate transitional shelter, or ‘necessity housing’—both in terms of quantity and quality—to accommodate residents during the retrofitting period; (ii) the unwillingness of residents to move out of their houses, and conversely, the absence of a supporting legal framework that proscribes living in buildings that are structurally unsound; (iii) the requirement to obtain 100 percent consensus from apartment owners to participate in the program, which has been difficult to achieve, given the legacy and the income-mix; and (iv) the lack of awareness and absence of any sense of urgency to address the risk associated with these buildings, given that the last major earthquake happened nearly 40 years ago. Moreover, surveys suggest that only 3 percent of owners would fully cover the cost of earthquake strengthening with more than 50 percent of owners expecting partial, full, or interest-free loans from the government to support works.

⁴³ Catalin-Constantin Rosu. “Complex Solutions for Seismic Recovery of Existing Buildings” (2017).

⁴⁴ <http://documents.worldbank.org/curated/en/722941468586112365/Cazare-%C3%AEn-Rom%C3%A2nia-spre-o-strategie-na%C5%A3ional%C4%83-de-locuin%C5%A3e-Armonizarea-investi-%C8%9Bilior-publice-Componenta-4>

⁴⁵ Buildings expected to collapse in low to moderate earthquake events.

⁴⁶ Ileana Calotescu, Florin Pavel and Radu Vacareanu. “Community seismic resilience for Bucharest, Romania: Public Survey Results.” *12th International Conference on Structural Safety and Reliability* (2017).

Public buildings

30. **Under a previous World Bank Project, the government conducted inventories of several categories of at-risk structures**, including schools, universities, hospitals, health care facilities, emergency response buildings, and structures of cultural or historic significance. Because of this initial assessment, 1,100 schools, 128 university buildings, and 65 hospitals were identified as being at risk of collapse or serious damage in an earthquake.

31. **The Ministry of National Education (MOE) has had several projects aimed at replacing older and poorly maintained kindergartens and elementary schools.** While there is some awareness of seismic risk, there have been no systematic approaches taken to assess the vulnerability of school assets to seismic risk and to undertake retrofitting and reconstruction programs. The MOE does have a database that covers many attributes relevant to assessing the risk from disasters and so it would be possible to develop a national prioritized list of schools requiring seismic strengthening. Any program of seismic strengthening should also include consistent communication with students, teachers, and the wider community.

32. **About 40 buildings have been identified by the Government as paramount in the emergency and disaster response and preparedness system—including emergency response headquarters, fire and rescue stations, police stations, command centers—and are assessed at high risk of partial or complete collapse during an earthquake.** Failure of these buildings during an earthquake may injure or kill vital first responders, and will significantly hamper response efforts. Moreover, more than 37 city hall or public administration buildings were also highlighted as at risk of collapse or damage, which would exacerbate recovery and reconstruction after disaster, and would jeopardize vital administrative functions (such as recording births, deaths, etc.). The program of seismic strengthening of buildings appears to be finally gaining some momentum, given that the 2016 budget of about 6 million euros is five times larger than that for 2015.⁴⁷ Nevertheless, the Municipality of Bucharest highlighted that only 75 buildings—most of them low-rise buildings—have been strengthened in the past 20 years.

33. **An assessment of the risk of earthquakes to the Energy Sector in Romania, completed in 2011, highlighted the extreme vulnerability of this sector to widespread disruption for different scenario events.**⁴⁸ Vulnerabilities arise particularly from: (i) insufficient seismic resistance in equipment, such as restraints and bolting; (ii) inconsistent and insufficient performance of seismic standards in the energy sector; and (iii) a lack of prioritized interventions to systematically reduce risk in the sector.

Preparedness, early warning systems, and response

34. **Given the country's experience with severe disaster events over the past years, the Government has made improvements to the country's emergency response system a national priority.** This includes enhancing early warning systems, modernizing equipment for search and rescue operations, integrating preparedness and response procedures for medical and nonmedical emergency situations, and developing information campaigns for local communities to raise awareness on exposure levels and on possible protective measures. Romania also reported several innovative approaches in terms of a countrywide public awareness strategy to stimulate a culture of disaster resilience within urban and rural communities. Romania has also received external help and support, including financial, several times during crisis. The country has activated the Community Mechanism for Civil Protection (MIC), and has

⁴⁷ https://www.igsu.ro/documente/Buget/buget_2010-2016.pdf

⁴⁸ 2011 BECA Preparation of an Energy Sector Risk Assessment Study.

received assistance because of heavy floods four times since 2005. This makes Romania one of the EU countries that has activated the MIC most frequently. At the same time, relative to citizens of other member states, Romanians tend to be less aware of the EU's civil protection activities. Recently the government, through the Ministry of Interior and the Department of Emergency Situations, has actively engaged local civil society to improve preparedness and response capability, and to start training volunteers to support response.

35. Starting in 2004, the government—through the Department of Emergency Situations and General Inspectorate for Emergency Situations—initiated a process to create a national information system for emergency situations (SMISU). This system enables local services to provide data on disaster and emergency situations and to determine support and resources available, and for this information to be monitored in near real-time, with support ready at national level should it be needed. The government has made a significant effort to ensure acceptance from all stakeholders at the national and subnational levels of the SMISU system, providing critical training and developing standard operating procedures. The SMISU system was officially accepted and launched on 2017.

Financial preparedness and resilience to financial shocks

36. Disasters create fiscal shocks that need to be managed, and given the magnitude of climate change impacts, these fiscal shocks are expected to grow in scale and frequency over time. Access to predictable, rapid, and flexible financing for disaster response, recovery, and reconstruction has been shown to reduce the social, physical, and fiscal impacts of disasters.⁴⁹ Increasing the financial response capacity enables governments to meet post-disaster funding needs without compromising fiscal balances and development objectives.⁵⁰ Disaster risk financing and insurance is also an integral part of climate risk management, especially as quantifying the financial and fiscal impact of risk can elevate this risk management agenda to ministries that control public investment.

37. Disaster risk financing in Romania currently relies strongly on ex-post financing instruments. This includes budget reallocation, donor assistance, and domestic or external credit and aid granted by the EU Solidarity Fund.⁵¹ For example, from 2000 to 2014, Romania has received, in regular contributions for disaster response and emergency relief, more than US\$ 7 million.⁵² Romania has also been receiving considerable support from the EU Solidarity Fund. For instance, more than EUR 47 million was granted to Romania in the period between 2007 and 2016 for floods and a drought. However, these funds are rarely sufficient to cover the economic losses suffered, and are intended to cover solely losses suffered by the public sector. For example, in 2009, following the severe flooding the previous year, Romania received only 2.5 percent of the cost of damages suffered.

38. In the aftermath of disaster, the financial cost of response, recovery, and reconstruction is a significant burden on government finances, both at the national and subnational level. Often, funding recovery involves results in the delay of key planned development and capital improvements. Following

⁴⁹ World Bank. *Shockwaves Report* (2016).

⁵⁰ "World Bank. *Financial Protection against Natural Disasters: An Operational Framework for Disaster Risk Financing and Insurance* (2014).

⁵¹ Regarding external aid, the EU Solidarity Fund provides financial support from the international community for Romania after natural disasters. The granting of this financial support is not conditional on affected states taking proactive measures to mitigate natural disaster, and it has mostly a humanitarian purpose.

⁵² <https://fts.unocha.org>

disaster, governments are confronted with both explicit and implicit contingent liabilities, where explicit liabilities include the reconstruction of public buildings and infrastructure, but implicit liabilities may come from public and media pressure to partially or fully contribute to the replacement of private housing (for the uninsured), to emergency housing, medical care, etc.

39. **In terms of disaster response and reconstruction, the government plays a central role, which can lead to significant burden on public finances.** During and directly after a disaster, governments provide emergency relief to the affected populations through a wide number of measures that can range from the distribution of food to building emergency shelters. Such disaster response expenditures require immediate access to liquidity and the swift mobilization of funds to mitigate the negative impacts of disasters on people and assets. If public infrastructure is damaged and not insured, the government would also need to account for significant reconstruction costs.

40. **Beyond direct financial costs, disasters—especially those that affect large or industrial areas of a country—can also have long-term macroeconomic impacts affecting the government’s budget.** Also, disasters may lead to an increase in spending on social assistance mechanisms to help the recovery of the affected population. Combined, the direct and indirect financial impacts of disasters can put a strain on public finances.

41. **To better manage the potential financial impacts of disasters, the government has started to shift toward a more comprehensive and ex-ante approach to post-disaster financing.**⁵³ The first post-disaster expenditure is covered primarily by the Intervention Fund. The Intervention Fund can also be supplemented throughout the year from the budget, specifically from the reserve fund of the government. The latter, however, can be also used to finance other urgent measures. The size of the Intervention Fund is not set in the legal provisions, and has been fluctuating over the recent years depending on the severity of disasters. For instance, in 2007 the allocation was increased from the planned EUR 3.6 million to EUR 174.9 million.⁵⁴

42. **In 2008, the Government of Romania also introduced mandatory insurance for homeowners, to insure people against catastrophes caused by earthquakes, floods, and landslides—the most prominent hazards in the country (Law 260/2008).** This scheme obliges all Romanian citizens to purchase bundled multi-hazard insurance, with the option of cover for either EUR 10,000 or EUR 20,000, depending on the quality of the building.⁵⁵ Thus, premiums depend only on the construction type and not on hazard probability or exposure. In economic terms, this amount will be not sufficient to repair the damage in case of a major or a total loss occurring to a building. However, it allows to owner to repair or to advance some money for a future building.

⁵³ http://www.daaam.info/Downloads/Pdfs/proceedings/proceedings_2011/1127_Zelinschi.pdf

⁵⁴ <http://www.orizonturi.ucdc.ro/arhiva/khe-vol9-nr2-2017/9.%20CATASTROPHIC%20RISK%20MANAGEMENT.pdf>

⁵⁵ According to Law 260/2008, houses are divided in two major categories, with different insured sums and different insurance premiums: A Class houses—building has its structure made of concrete, iron, wood and external walls made of stone, bricks or other building materials resulting from a thermic or chemical process. For these A Class houses the insured sum is €20,000 and insurance premium is €20. B Class houses—building has its external walls made different materials that did not result from a thermic or chemical process. For these B Class houses, the insured sum is €10,000 and the insurance premium is €10.

43. **The mandatory insurance is managed by the Insurance Pool against Natural Disasters (PAID)**—a commercial insurance and reinsurance company—that was established in 2009 with the purpose of: (i) providing timely pay-outs to the affected households; (ii) providing an accessible product; (iii) reducing the budgetary impact of natural disasters; and (iv) contributing to the financial education of the public on the insurance as an indispensable mean of protection. The government has supplemented the provision of the catastrophe insurance by the decision not to provide financial benefits after disasters to any noninsured household. It has also ruled to punish the noncompliance with the compulsory insurance law by a fine.⁵⁶ As of 2016, the catastrophe insurance currently covers approximately 20 percent of households—almost 2 million households—across the country, with higher penetration rates in urban than in rural areas.

44. **However, since its inception PAID has been plagued by legal and regulatory challenges.** Over the last few years PAID recorded very sluggish growth in the number of homeowners covered by the program—20 percent—because of the difficulties with the enforcement of the compulsory insurance requirement. Currently, uninsured homeowners face no penalties. Local governments, which are responsible for the enforcement of the compulsory insurance requirement, have neither the technical means nor the political incentives to fulfill this legal mandate. The program also suffers from flaws with the current design of the insurance product. The PAID insurance policy has no deductible, which encourages insurance fraud and increases the cost of servicing the product; it suffers from insufficient coverage limits, and is sold at a price that does not cover the long-term cost of the risk.

45. **Public financial resources would be extremely strained should a repeat of the 1977 earthquake occur.** Public financial resources from the state and local budgets, in the form of contingency funds, are intended to limit and to deal with the effects of known and regular natural disasters expected during each current financial year. The great disadvantage of this source of funding is that these resources are insufficient to meet the high economic losses caused by extreme natural events with a recurrence period of tens or hundreds of years. **For example, the US\$2 billion damage bill from the 1977 earthquake is more than 666 times the typical budget currently allocated to the Intervention fund.**

46. **The government of Romania remains severely exposed to large financial losses from natural disasters, which are affecting the fiscal planning and economic stability of the country and the well-being of its population.** This exposure requires a comprehensive approach to ensure predictable and flexible funding for emergency relief, and to provide options for funding for longer term reconstruction. Specifically, by strengthening the government’s financial capacity for effective response, it is possible to reduce humanitarian impacts, protect the national budget from disaster shocks, and safeguard the development achievements.

⁵⁶ <https://paidromania.ro/en/description>

Recommendations to Strengthen Disaster and Climate Resilience

47. **The increased incidence of natural disasters, coupled with the projected climate outlook for Romania, highlight the need for a comprehensive disaster and climate risk management program.** A framework for action should include:

- A. **Policy reform aimed at building cross-sectorial resilience to climate and natural disaster risks.** Legislative, policy, and regulatory changes are critical to build an enabling environment for resilience.
- B. **Promoting financial resilience at household and government levels.** There is an urgent need to strengthen protection for households against the cost of damage associated with disasters, and to enhance the government’s capacity to manage the fiscal impacts of natural disasters.
- C. **Prioritizing urgent investments in disaster and climate risk reduction.** Although Romania has made significant progress in early warning, preparedness, and risk information, actual investments in risk reduction are limited, especially when the scale of climate and disaster risk in Romania is considered.

