

THE INSURANCE SECTOR FROM A SUSTAINABLE DEVELOPMENT PERSPECTIVE. FOCUS ON SDG 13: CLIMATE CHANGE

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Abstract

This paper's objective is to assess the insurance sector's role in promoting sustainable development, particularly in addressing climate-related risks and specific Sustainable Development Goals (SDGs). One of the main goals is to examine how insurers address environmental, social, and governance (ESG) factors in their operations. We'll look closely at the European regulatory landscape, including taxonomy regulations and the 2030 Agenda. The paper highlights how insurance companies can mitigate the economic and social impact of climate change. It also assesses how the insurance sector aligns with key SDGs, with a particular focus on SDG 13 (Climate Action). Analyzing data on the European Union (EU) and Romania, this study shows the impact of climate-related risks on insurance losses. Climate-related risks have become more frequent since 2018 and have had a stronger impact each year. The economic losses recorded by EU member states since 2017, except for 2020, exceed the average losses calculated for the entire period 1980-2023. Also, annual losses in the EU during 2021-2023 reached the highest values registered across the 44 years analyzed.

Keywords

Insurance, sustainable development goals, climate change, loss, natural events, ESG, sustainability, climate risk management

JEL Classification

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Introduction

The insurance sector plays a key role in today's economies by managing risks and ensuring financial stability. On a global scale, with a percentage of GDP of around 7,3%

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(Insurance Regulatory and Development Authority of India, 2025¹), the insurance sector is important for protecting assets, alternative investment plans, and economic resilience. This paper includes an analysis of how climate change has negatively impacted the number and intensity of natural disasters. Lately, this industry has been facing new challenges, especially with the rise of environmental, social, and governance (ESG) issues, with climate change among the most visible in recent years, leading to significant economic losses and putting pressure on insurance systems around the world. Because of this, insurers have to rethink their business models and adapt their underwriting practices and investment strategies to keep up with the new risks. In addition to this, as expectations from stakeholders grow and regulations tighten - especially in Europe- the integration of sustainability into insurance is more visible. In this light, sustainable development has become a hot topic for both public policymakers and businesses alike. The United Nations 2030 Agenda and its 17 Sustainable Development Goals (SDGs) provide a plan for tackling economic, social, and environmental issues together. The insurance sector is crucial here—not just by offering ways to transfer risk but also by guiding where capital goes and encouraging sustainable practices.

1. Review of the scientific literature

One of the pillars of every country's economy is the insurance sector. Globally, the insurance industry plays a significant role, accounting in 2024, 7.3% of global GDP (Insurance Regulatory and Development Authority of India, 2025), with gross written premiums totalling \$7,8 trillion (out of which \$4,3 trillion are from non-life insurance and \$3billion are from life insurance) —far exceeding the aggregate GDP of large countries such as Spain, Italy, and France. Romania is one of the countries with the lowest insurance penetration in Europe, at 1.1% in 2024; on the other hand, Luxembourg has an insurance penetration of 33% (OECD, 2025). In OECD countries, the insurance penetration was 6.2% in 2024 (OECD, 2025).

In an article published by Matthew Shea and J. Hutchin in the Thunderbird International Business Review, they noted that the insurance industry is vulnerable to emerging risks stemming from environmental, social, and governance (ESG) sustainability factors. Insurance companies will rely on internal policies and underwriting practices to manage the inherent risks to which they are exposed, which vary in terms of frequency or severity. Alternatively, senior industry members have reported that ESG issues influence underwriting activities, but the industry's continued resilience to these issues requires a systematic integration of the perspectives of various stakeholders.

In the report published by KPMG UK in 2024², it was stated that reporting requirements and stakeholder expectations are expected to increase in terms of complexity and importance. At the same time, insurers should understand which environmental, social, and governance factors may materialize in the company's operations and establish measures within the organization to manage the associated challenges and opportunities.

¹ Insurance regulatory and development authority of India, Annual Report for 2024, 2025

² KPMG UK- ESG in insurance: A practical guide to sustainability reporting

Insurance companies are unique in that they play a dual role: on the one hand, as risk managers (paying claims in the event of an insured risk), and on the other hand, as asset managers (in the case of life insurers) (Junsun, 2021). Due to the volume of capital they manage, insurance companies can redirect capital flows toward carbon-neutral activities (Braun, Utz & Xu, 2019).

2. Research methodology

Research data

For this research, I have used comparative analysis and time-series analysis. Descriptive statistical methods were used to calculate average annual losses and assess temporal trends. The analytical methods used include graphical and statistical representations. The processing was done using Microsoft Excel, which enabled the interpretation of trends.

For the time-series analysis of economic losses for European Union member states as a result of the occurrence of climate risks for 1980-2023, data from EUROSTAT were used. For the graphical representation of global losses recorded vs. insured losses due to natural perils, data published by Munich Re were used.

For the loss ratio on A8 and A9 insurance classes, data from the Financial Supervisory Authority Reports were used.

Annual losses recorded after 2017 were compared with the long-term average for the entire study period in order to identify shifts in the intensity and frequency of climate-related impacts.

Limitations

The analysis is limited by differences in reporting methodologies among Member States, the accuracy of the data published, and the potential underestimation of losses.

3. Results and discussion

• Sustainable Development Goals

In 2015, Romania joined the 2030 Agenda for Sustainable Development, aligning with other United Nations member countries. 17 Sustainable Development Goals (SDGs) have been set, each comprising a specific set of targets—precisely 169 in total—that are monitored using different indicators. The concept of SDGs first emerged at the United Nations Conference on Sustainable Development, referred to as Rio+20, in 2012.

Among the aforementioned objectives, according to a study conducted by the World Bank Group (2021), the impact of the insurance sector on the sustainable development objectives was analyzed. Thus, based on the study, it was concluded that there are four SDGs for which the insurance sector has a significant impact (SDG 13 („Climate change”), SDG 11 („Sustainable Cities and Communities”), SDG 3(“Good Health and Well-being”), SDG 10 (“Reduced Inequalities”), three SDGs for which the impact is major (SDG 1 (“No Poverty”), SDG 8 (“Decent Work and Economic Growth”), SDG 2(“Zero Hunger”)) and the rest (10 SDGs), on which the impact was assessed as moderate.

For each sustainable development goal (SDG), targets and indicators have been defined. Therefore, for the sustainable development goal that is the subject of this work, namely SDG 13 (climate change), several targets and indicators have been set, one of them

being „strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries” (European Commission³). Another target is „to integrate climate change measures into national policies, strategies, and planning”. Each target is evaluated through various indicators, such as the number of deaths and missing persons attributed to disasters per 100,000 population or the proportion of local governments that have adopted and implemented local disaster risk reduction strategies aligned with national disaster risk reduction strategies, as well as total annual greenhouse gas emissions, etc.

In the Global Risks Report for 2026, published by the World Economic Forum, 10 risks were identified at a global level, considering two scenarios analyzed, respectively, for 2 years and 10 years. Compared with the same report available for 2023, the classification of risks has changed. According to the report for 2023, for the 2-year scenario, the major risks identified were the cost of living crisis, followed by natural disasters and extreme weather conditions. Out of the 10 risks identified, five were environmental risks, and three were social risks. The situation has changed lately due to armed conflicts and wars (i.e., the war in Ukraine, the conflict in Gaza, the Middle East conflict), which have changed the classification of the main risks the entire world is exposed to. Having said that, based on the same report published in 2026, the top 4 risks identified for the following 2-year scenario were :

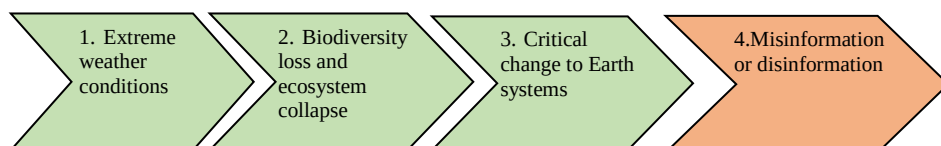
Figure no. 1- Top four major risks at the global level, for the next 2 years



Source: World Economic Forum, The Global Risks Report, 2026

In the same report, for the second scenario analyzed, respectively 10 years period, an intensification of environmental risks was noted, as it resulted from the fact that 6 out of 10 identified risks are environmental. Moreover, the first 3 positions are occupied by environmental risks, as follows:

Figure no. 2- Top 4 major risks at a global level, for the next 10 years



Source: World Economic Forum, The Global Risks Report, 2026

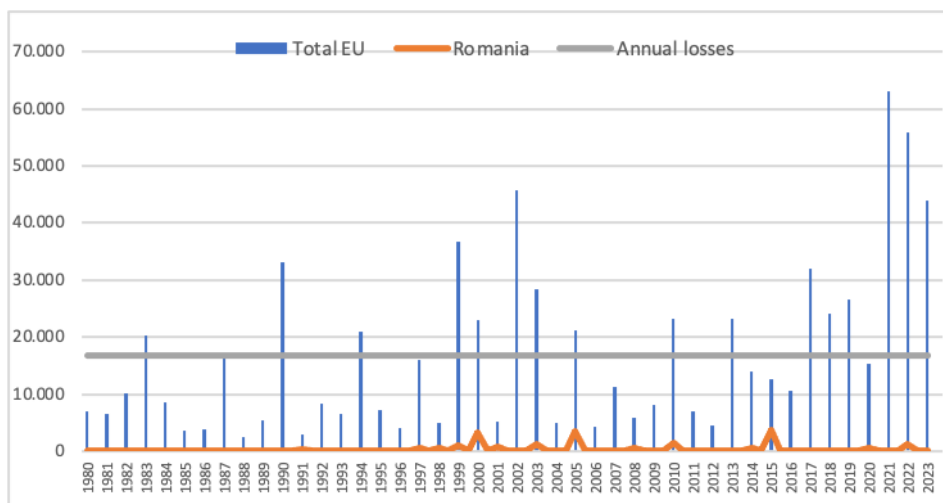
³ <https://know-sdgs.jrc.ec.europa.eu/sdg/13>

Related to Romania, the top five risks identified in the questionnaire in the World Economic Forum Report for 2026, for the next two years, are economic, geopolitical, and social risks, as follows: 1. Misinformation or disinformation 2. Economic downturn 3. Debt 4. Decline in health and well-being 5. Adverse outcomes of AI technologies. Even if, in the short term, climate risks have lost ground to geopolitical and economic risks, this is a transitory situation, and in the medium and long term, the main risks remain climate and natural-disaster risks.

Susan Holliday et al. (2021) believe that insurance plays a role in achieving sustainable development goals from three perspectives, one of them being the effect of insurance on the sustainable development goals through economic growth, social impact, and environmental protection.

According to data from EUROSTAT, for the period 1980-2023, the economic losses recorded at the EU level due to the occurrence of climate risks, expressed in million EUR, evolved as follows:

Figure no. 3- Evolution of economic losses for European Union member states as a result of the occurrence of climate risks, in the period 1980-2023 (million EUR)



Source: EUROSTAT data

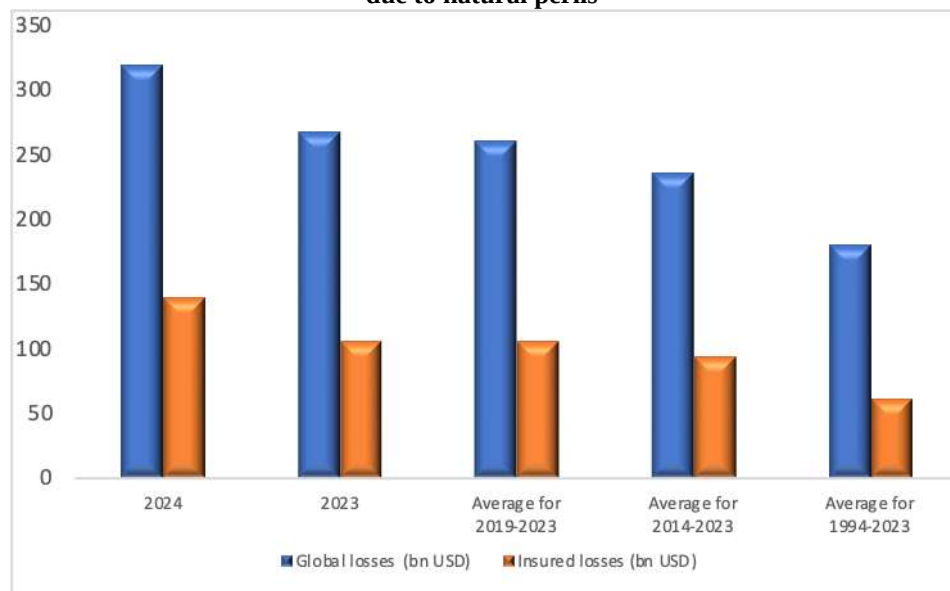
Thus, as can be seen from figure no 7, the annual economic losses recorded by EU member states since 2017, except for 2020, exceed the average losses calculated for the 44 years, respectively, 1980-2023. Moreover, except for 2002, it can be seen that in the last 3 years (2021-2023), annual losses reached the highest values registered in those 44 years analyzed.

In 2023, the highest losses due to climate risks were recorded by Italy (35.87% of total losses at the EU level), Slovenia (22.84% of total losses at the EU level), and Spain (16.25% of total losses at the EU level).

According to a report published by the European Central Bank and EIOPA⁴ in December 2024, during the period 1981-2023, at the level of the European Union member states, damages caused by natural disasters/extreme weather conditions were recorded in the aggregate amount of approximately EUR 900 billion, and only a quarter of these losses were insured, highlighting the fact that there were states in which the percentage of insured losses was less than 5%. For the period 2021-2023, the values of the recorded losses were EUR 65 billion (2021), EUR 57 billion (2022), and EUR 45 billion (2023), which means 18% of the aggregate losses for the period 1981-2023

In 2024, according to a study conducted by MunichRe NatCAT Service in January 2025, the global losses caused by natural disasters were approximately USD 320 billion, an increase of approximately 20% compared to the previous year (USD 268 billion). In terms of insured losses, these were \$140 billion in 2024, representing a 32% increase compared to the previous year.

Figure no. 4– Graphical representation of global losses recorded vs. insured losses due to natural perils



Source: Munich Re NatCat Service- Natural disasters in 2024

⁴ European Central Bank & EIOPA (2024)- Towards a European system for natural catastrophe risk management - https://www.ecb.europa.eu/pub/pdf/other/ecb.climateinsuranceprotectiongap_EIOPA202412~6403e0de2b.en.pdf

In Europe⁵, the estimated value of losses in 2024 was 31 billion USD, out of which 14 billion USD were insured. The three largest events in 2024, which cumulated total losses of 20.3 billion USD, representing 65.5% of total losses in Europe, were:

Table 1- Top 3 loss-causing events in EU countries

Countries impacted	Cause of loss	Period	Registered losses	Insured losses
Spain	Heavy floods	28.10.2024-30.10.2024	11 billion USD	4.2 billion USD
Germany, Poland, Italy, Austria, Czech Republic	Floods + heavy floods	30.05.2024-06.06.2024	5 billion USD	2.2 billion USD
Czech Rep., Austria, Poland, Italy, Slovakia, Romania, Hungary	Floods + Boris storm	12.09.2024-21.09.2024	4.3 billion USD	2.1 billion USD
TOTAL			20.3 billion USD	8.5 billion USD

Source: Munich Re NatCat Service- Natural disasters in 2024

The increase in annual losses caused by natural perils can be justified by corroborating two factors: the improve of the people's living standards over the years, leading to more valuable properties, which in case of a loss, determine a higher loss amount, and in the same time, climate change which has made natural events more frequent, creating more damages (higher frequency and severity of losses). In addition, it should be emphasized that more than a third of the total population of Europe lives in coastal regions, and the expected changes in the frequency and severity of natural events represent a major threat to ecosystems and the population in low-lying coastal areas in northern and western Europe⁶ (European Environment Agency, 2021).

Von Peter et al. (2012)⁷ stated that in the event of a catastrophe, the recovery is faster and more complete when a large share of risk is insured. At the same time, the study by Linda Fache Rousová et al. (2021) demonstrated that the aggregate impact of increasing climate risks on well-being is not predetermined, and insurance has a key role to play in mitigating the impact that future catastrophes could have.

According to the same study, only 56% of damages caused by meteorological events (e.g., hurricanes and storms) in Europe are currently insured. For hydrological events

⁵ Munich Re NatCat Service (ianuarie 2025)- Natural disasters in 2024

⁶ European Environment Agency (2021)- Coastal related sea level, <https://www.eea.europa.eu/publications/europes-changing-climate-hazards-1/coastal/coastal-relative-sea-level>⁶

⁷ von Peter, G., von Dahlen, S. and S. Saxena (2012), "Unmitigated disasters? New evidence on the macroeconomic cost of natural catastrophes", BIS Working Papers, No 394.

(e.g., landslides and floods), coverage drops to 28%, and for climatological events (e.g., extreme temperatures, droughts, and wildfires) to just 7%.

As extreme weather intensifies, losses are expected to increase for both individuals and legal entities.

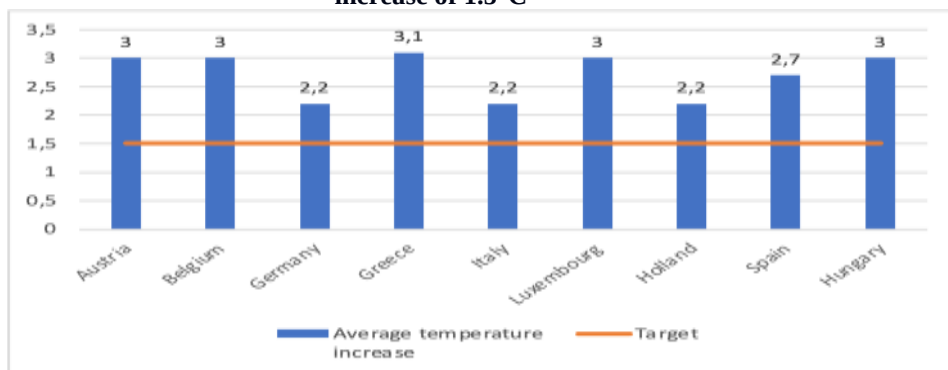
- **Climate change challenges**

Through the Paris Agreement, 55 countries responsible for at least 55% of global greenhouse gas emissions have ratified an international treaty, applicable as of the 4th of November 2016, whose signatories have a legal obligation to combat climate change. By this agreement, an action plan was set out to limit global warming to 1.5°C by the end of the century.

At the European Union level, all member countries have signed the Paris Agreement. Thus, the member states agreed to transform the European Union into a climate-neutral economy by 2050, with net-zero greenhouse gas emissions, boosting the economy with green technology, ensuring sustainable activities in industry and transport, and reducing pollution.

According to information on the website of the Council of the European Union, by 2020, the reduction in gas emissions exceeded the forecast by 20%, with the actual reduction exceeding 30% compared to the reference year 1990. According to a study (Bailey, 2022), the limit established by the action plan to limit global warming, namely keeping the increase in average temperature to no more than 1.5 °C, is not being met. Based on the data presented in the aforementioned study, across EU countries, the recorded increase in average temperature exceeded 1.5 °C. For example, in Greece, the average temperature increased by 3.1°C, in Austria, Belgium, Luxembourg, and Hungary, by 3°C, in Spain by 2.7°C, and in Germany, the Netherlands, and Italy by 2.2°C.

Figure 5 – Average temperature increase versus European Union targeted increase of 1.5°C



Source: www.oliverwyman.com/our-expertise/insights/2022/sep/cdp-temperature-ratings.html.

According to the International Association of Insurance Supervisors (IAIS), climate change refers to the warming of our global climate system, which includes the atmosphere, oceans, and land surfaces. Insurers really feel the impact of these climate risks in claims arising from those risks, which they must pay, and, on the other hand, in the profits of their investment portfolios. Back in June 2020, a new legislative framework (the Taxonomy Regulation) was approved to clarify which activities can be deemed sustainable. The European Union sets six environmental and climate goals:

1. Mitigating climate change
2. Adapting to climate change
3. Sustainable use and protection of water and marine resources
4. Shifting towards a circular economy
5. Preventing and controlling pollution
6. Protecting and restoring biodiversity and ecosystems.

Starting from 2023, financial companies are required to disclose information about how well they align with the first two of these six EU environmental objectives. For insurance companies specifically, there are certain key figures they have to follow: namely, the percentage of "green" investments in their total investments and the extent to which their gross premiums for non-life insurance align with the taxonomy standards.

- **Climate risks - insurers**

Insurance companies are exposed to risks that are assessed and reported in their annual report, named ORSA (Own Risk and Solvency Assessment). This report is prepared annually or whenever the insurer's risk profile changes. Starting from 2022, insurance companies must identify climate risks and assess their impact, integrating this information into their risk profiles. Evaluations of climate risks must include both qualitative and quantitative components. At the insurance company level, sustainability can be viewed from several angles. An insurance company can be considered sustainable if it meets necessary operational conditions over a long period to fulfill its payment commitments made through insurance contracts.

Climate risks impact the company's assets and liabilities.

Concerning the assets of an insurance company, the impact of climate risks can be observed in:

- Devaluation of the company's assets - assets may suffer losses in their market value;
- Return on the company's investments - with the emergence of climate risks, capital markets may experience negative fluctuations.
- Portfolio structure - insurance companies are required to comply with ESG factors (environmental, social, governance), which is why insurance products may change, including by waiving certain products or changing insurance conditions, so that companies maintain their profitability and comply with regulations in force.

Regarding the liabilities of an insurance company, the impact of climate risks can be observed in:

- Increase in the frequency and severity of claims.

As we have previously presented, the global trend is an increase in the probability of extreme weather events, which leads to an increase in claims and, in turn, in indemnities paid by insurers.

- Increase in premium rates/ insurance premiums

An increase in the frequency and severity of claims while maintaining similar premium rates and the same terms and conditions leads to an increase in the loss ratio.

Any insurance company takes measures to mitigate the risks to which it is exposed, one of these measures is reinsurance, meaning the transfer of a part of the risks to third parties named reinsurers. An increase in the amounts paid by the reinsurer as a result of a loss caused by an insured event determines, depending on the profitability of the ceded portfolio, an increase in the reinsurance premium rates for the following period.

As a result, this increase is passed on to the insured through higher insurance premium rates and/or restrictive terms and conditions (i.e., the introduction of additional deductibles, etc).

The increase in insurance premium rates might trigger a decline in the demand of consumers for insurance, especially for low-income customers. Moreover, there are situations in which, given the losses recorded by insurers and/or reinsurers, and in the absence of some measures to reduce/limit/control the occurrence of those events causing losses, there could be risks which become uninsurable. For example, this is the situation of some properties in California. Given that the fire risk in California is high, there are areas for which insurers no longer underwrite such risk.⁸ Thus, in 1968, the state established a California Fair Plan insurance program for the risk of fire, lightning, explosion, and smoke, financially supported by private insurers. However, the program offers a limited solution and does not fully cover the damage. In January 2025, a wildfire broke out in California, which, according to data published by the European Centre for Medium-Range Weather Forecasts (ECMWF⁹), caused economic losses estimated at 150 billion USD, and 200,000 people were evacuated.

The European Insurance and Occupational Pensions Authority (EIOPA¹⁰) classified the climate risks in 3 categories:

- physical risks that result from increased damage and loss caused by physical phenomena associated with climate trends
- transition risks - financial risks resulting from the transition from the current high-carbon economic system to a new low-carbon economy
- liability risks - arising from climate-related claims filed by third parties under third-party liability insurance policies

Floods, heat waves, droughts, and rising average temperatures in both the warm and cold seasons have intensified in recent years. According to a report published by the European Environment Agency, Europe is experiencing heat waves more frequently and intensely. In the summer of 2022, the report estimated that between 60,000 and 70,000

⁸ <https://www.bankrate.com/insurance/homeowners-insurance/california-fair-plan/>

⁹ <https://www.ecmwf.int/en/about/media-centre/science-blog/2025/2025-california-wildfires-insights-ecmwf-forecasts>

¹⁰ https://www.eiopa.europa.eu/system/files/2019-12/2019-09-30_opiniononsustainabilitywithinsolvencyii.pdf

deaths in Europe were recorded due to heat. The risks associated with heat waves have reached critical levels in southern Europe.

Heat-related fires can cause material losses, death, or bodily injuries requiring medical care, thereby increasing the costs of medical care and medical recovery. Referring to the wildfires that occurred in the USA, according to data published by the Insurance Information Institute¹¹, the 3 largest events have occurred since 2018. In 2025, two major wildfire events were registered: 1st being the Palisades fire in California (only in 2025, the total estimated insured losses were 23 billion USD), 2nd being the Eaton Fire (only in 2025, the total estimated insured losses were 17.5 billion USD). The Camp Fire ranked third, with estimated insured losses of 12.8 billion USD.

In Romania, the loss ratio for fire and natural perils (A8 and A9 insurance classes) slowly increased in the period 2021-2023, as follows:

Tabel no. 2- Romania- Loss ratio for A8 and A9 insurance classes

	Loss ratio	Acquisition and administration ratio	Combined loss ratio
2021	24.13%	39.67%	63.80%
2022	32.49%	42.87%	75.36%
2023	33.64%	42.12%	75.76%

Source: Financial Supervisory Authority Reports- author's processing

In 2024, only for insurance class A8, the volume of gross written premium and the volume of gross indemnities paid increased by 18%.

In accordance with a sociological survey¹² made by IRES for the National Union of Insurance and Reinsurance Companies of Romania (UNSAR), the effects of climate risks that affected people were due to: storms (43%), heat waves (19%), drought (15%), and floods (11%).

Conclusions

The study shows that climate change is causing a series of extreme natural events-floods, heavy rains, fires, etc. - which have had, and continue to have, a negative impact on both individuals and businesses. Insurance is an underestimated protective tool that protects individuals and businesses against risks, including those determined by climate change risk. Of the approximately EUR 900 billion in estimated worldwide losses for the period 1981-2023 from climate risk events, only a quarter was insured. Global losses registered in 2024 rose by 20% compared to the previous year, whilst the insured losses increased by 32%.

In Europe, the 3 largest events registered in 2024 (20.3 billion USD) account for 65.5% of total losses.

¹¹ <https://www.iii.org/fact-statistic/facts-statistics-wildfires>

¹² <https://unsar.ro/>

The increasing frequency and severity of climate-related events pose a major challenge not only for insurers and reinsurers but also for individuals and, last but not least, for governments seeking to protect their budgets against the escalating financial impacts of natural catastrophes.

For insurers and reinsurers, some of the challenges include difficulties in modeling risks and higher claims costs, which impact insurance premium rates, making insurance products more difficult to sell and less attractive to consumers, and, on the other hand, higher capital requirements.

Against a backdrop of increasingly frequent extreme weather events, individuals are increasingly exposed to financial losses and higher insurance costs, and, in the worst-case scenario, some risks could become uninsurable (see the case presented above related to the fire risks in some areas in California which insurers no longer cover).

It is important to highlight the challenges faced by governments, as disasters caused by climate-related events necessitate state intervention, with the aim of minimizing losses, saving lives, and providing support and maintaining economic stability through involvement in the reconstruction process and through social measures aimed at disadvantaged people. The higher the insurance penetration rate as a proportion of GDP, the less pressure there is likely to be on the state budget. But Romania still has room to develop, having the lowest insurance penetration rate in Europe.

Therefore, in the context of climate change, the insurance sector plays a significant role in ensuring sustainable development, facing challenges in terms of the frequency and severity of claims, and regulations that become more demanding in integrating environmental, social, and governance (ESG) factors. The insurance sector has a contribution to climate action by promoting risk awareness, improving financial education, and adapting products to new risks.

The involvement of all stakeholders in the insurance sector in improving financial education, raising risk awareness, and developing insurance products adapted to new challenges is essential for achieving sustainable development goals and maintaining a resilient, sustainable economy.

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