

MILLIMAN REPORT

Extreme weather events in Europe for 2021 and beyond

Insurance industry impact and actionable steps for insurers to take a leading role in managing climate-related financial risks

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Table of Contents

EXECUTIVE SUMMARY	1
AUSTRIA	2
BELGIUM	3
FRANCE	4
GERMANY	5
ITALY	7
LUXEMBOURG	11
THE NETHERLANDS	11
UNITED KINGDOM	13
OUTLOOK FOR THE FUTURE	16
OVERVIEW	16
FUTURE OUTLOOK BY EUROPEAN COUNTRY	17
ACTIONABLE STEPS FOR INSURERS	21
ENSURE YOUR ORGANISATION IS ACTIVELY CONSIDERING CLIMATE RISK	21
IMPROVE THE ASSESSMENT OF FUTURE EXPECTED LOSSES	21
TAKE A STRATEGIC APPROACH TO MANAGING CLIMATE RISK	21
ENGAGE WITH POLICYHOLDERS AND POLICY MAKERS	22
USE RISK AS AN OPPORTUNITY	22
STAY CURRENT WITH THE MILLIMAN CLIMATE RESILIENCE INITIATIVE	22

Executive Summary

In February 2022, the Intergovernmental Panel on Climate Change (IPCC) released its latest report, confirming that climate change induced by humanity is already impacting nature and people more intensely, more frequently and over a wider geographical area than previously thought and that some effects are now unavoidable.¹ Climate change continues to be evident across Europe:

- Each European country's climate continues to warm. For example, average temperatures for the UK continue to climb with the last 30-year period (1991-2020) 0.9°C warmer than the preceding 30 years (1961-1990).²
- Winters have been getting wetter, and summers have become drier, with an increased rate of intensity and frequency over the recent years.
- Several European countries have been experiencing consecutive wind and rain storms, bringing devastating damage to many homes and businesses. The aggregated damages of consecutive storms have typically been greater than the aggregated damages for similar storms spread across the year.
- On the other hand, drier conditions have made it difficult for farmers and growers, adversely affecting the agricultural industry.

2021 was an unusual year, with extreme weather events bringing above-average claims to European insurers.

The costliest event was the July 2021 flooding in Germany, Belgium and nearby countries. This flood disaster caused up to USD 13 billion in insured losses (approximately EUR 11.5 billion as of February 2022), compared to more than USD 40 billion in economic loss (approximately EUR 35.3 billion as of February 2022), indicating a very large flood protection gap. The flooding was the costliest natural disaster for the region since 1970 and the world's second-highest in that period, after the 2011 Thailand flood.

Further devastating secondary peril activity included severe convective storms in June, with thunderstorms, hail and tornadoes causing widespread damage to property throughout Europe. The resulting insured losses are estimated at about USD 4.5 billion (approximately EUR 3.9 billion as of February 2022).³

New high-resolution climate models predict more frequent and severe European extreme weather events in the future. Researchers calculate that more moisture-rich, slower-moving storms will become more commonplace in the decades to come due to a warming planet.⁴ Another climate change-related trend shows higher levels of fire danger in Europe, longer fire seasons and intense spreading "mega fires," over which traditional firefighting means have little power.⁵

A multinational commitment and actions to cut greenhouse gas emissions is key to curbing climate change. Although significant progress was made at the 2021 United Nations climate conference in Glasgow, further efforts are needed to reach the international goal of limiting future warming to 1.5°C, which scientists have found will avoid or lessen some of the most catastrophic weather events.⁶

¹ European Commission (28 February 2022). Urgent need to adapt to massive impacts of climate change highlighted in latest IPCC report. Retrieved 10 March 2022 from https://ec.europa.eu/clima/news-your-voice/news/urgent-need-adapt-massive-impacts-climate-change-highlighted-latest-ipcc-report-2022-02-28_en.

² Met Office (29 July 2021). Climate change continues to be evident across UK. Retrieved 10 March 2022 from <https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2021/climate-change-continues-to-be-evident-across-uk>.

³ Insurance Journal (14 December 2021). Extreme Weather in 2021 Brings Above-Average Claims to Global Insurers: Swiss Re, Retrieved 10 March 2022 from <https://www.insurancejournal.com/news/international/2021/12/14/645544.htm>.

⁴ CNN (8 November 2021). More extreme weather events in the future predicted by new high-resolution climate model. Retrieved 10 March 2022 from <https://www.msn.com/en-us/weather/topstories/new-high-resolution-climate-model-predicts-more-extreme-weather-events-in-the-future/ar-AAQqM4r>.

⁵ European Commission (29 October 2021). Commission Report on Forest Fires: Climate Change Is More Noticeable Every Year. Retrieved 10 March 2022 from https://ec.europa.eu/commission/presscorner/detail/en/ip_21_5627.

⁶ Associated Press (8 November 2021). The magic 1.5 degrees: What's behind the COP26 climate talks' key elusive goal. MarketWatch. Retrieved 10 March 2022 from <https://www.marketwatch.com/story/the-magic-1-5-degrees-whats-behind-the-cop26-climate-talks-key-elusive-goal-01636384778>.

As climate disasters are becoming more likely and frequent, extreme weather events could have devastating economic consequences for Europe due to underestimated risks⁷ and insurance gaps. Insurers and government officials are calling for higher risk awareness, including investing in protective infrastructure to limit the damage caused by future disasters and protect human lives. Economists estimate that every euro invested in climate change protection saves 15 euros in payment for climate damage.⁸ Additionally, governments like Germany are calling for insurance reforms to significantly increase the number of policyholders at risk-appropriate prices.⁹

This paper focusses on the extreme weather events in 2021 (including floods and hail) that had the most impact in Austria, Belgium, France, Germany, Italy, Luxembourg, the Netherlands and the United Kingdom (UK), and it discusses the economic costs, human loss and impact on insurers. With hundreds of fatalities, and billions of euros in damage to homes, property, vehicles and agriculture, extreme weather events in 2021 had a major impact on a society already dealing with the effects of the COVID-19 pandemic and lockdowns. For example, COVID-19-related inflation increased the price of building materials, making reconstruction of flooded homes and businesses more expensive and costing insurers even more.¹⁰

It is business-critical for European insurers to leverage their expertise and data analytics capabilities to take a leading role in managing the financial risks associated with extreme weather events and climate change. These risks can impact both sides of an insurer's balance sheet by changing the underlying risk profile of certain insurance products and overvaluing the insurer's assets due to unassigned risk. This paper concludes with immediate actionable steps insurers can take to manage these risks, including actively considering climate risks across the organisation, improving the assessment of future expected losses, engaging with policyholders and policy makers, and developing new insurance products and services.

Austria

2021 EXTREME WEATHER EVENTS

In June 2021, numerous thunderstorms moved across Austria and severe hailstorms affected the northern and eastern regions of the country. Very large and giant hailstones, the size of tennis balls, were reported. Dozens of cars were damaged, telephone poles and trees were knocked down and heavy rain caused flooding.

On 17 July 2021, damaging floods swept through areas along the Salzach River and its tributaries in the state of Salzburg:

- The town of Hallein was particularly strongly hit with muddy water flowing through the town's streets.
- The Almbach river, which meets the Salzach River at Hallein, rose from around 2 metres to 3.77 metres in a few hours.
- Areas further west were also affected, with flash flooding impacting the town of Kufstein in the province of Tyrol.¹¹

HUMAN LOSS

One person died in the Austrian floods.¹²

ECONOMIC IMPACT

The agriculture industry was severely impacted by the June hailstorms. A total loss of agricultural crops in the provinces of Upper Austria and Lower Austria added up to about EUR 28 million.¹³

⁷ KIT (2021). Flood Risks Were Clearly Underestimated. Retrieved 10 March 2022 from https://www.kit.edu/kit/english/pi_2021_070_flood-risks-were-clearly-underestimated.php.

⁸ Kiel, V (24 September 2021). The coming disasters. SPIEGEL Science. Retrieved 10 March 2022 from <https://www.spiegel.de/wissenschaft/natur/extremwetter-wie-sich-deutschland-auf-zukunfftige-naturkatastrophen-vorbereiten-sollte-a-fcf8ac1a-8265-4bcf-b040-c4154d13d386>.

⁹ Focus Versicherungsprofi. "Flood: GDV raises damage forecast significantly. Retrieved 10 March 2022 from https://versicherungsprofi.online/branche/assekuranz/flut-gdv-korrigiert-schadenprognose-deutlich-nach-oben_01399/.

¹⁰ Merkur.de (19 October 2021). Flood disaster could become even more expensive for insurers. Retrieved 10 March 2022 from <https://www.merkur.de/wirtschaft/flutkatastrophe-koennte-fuer-versicherer-noch-teurer-werden-zr-91058492.html>.

¹¹ Floodlist (18 July 2021). Austria and Germany – More Deadly Floods After Heavy Rain. Retrieved 11 March 2022 from <https://floodlist.com/europe/austria-germany-bavaria-floods-july-2021>.

¹² BR24 NEWS (18 July 2021). Floods in Austria are shifting to Tyrol. Retrieved 11 March 2022 from <https://www.br.de/nachrichten/meldung/hochwasser-in-oesterreich-verlagert-sich-nach-tirol,3003d873e>.

¹³ Austrian Hail Insurance (25 June 2021). Doomsday Mood Causes Another Sad Record – 28 Million Euros Damage. Retrieved 11 March 2022 from <https://www.hagel.at/presseaussendungen/weltuntergangsstimmung-verursacht-einen-weiteren-traurigen-rekord-28-millionen-euro-schaden/>.

IMPACT ON INSURERS

The June hailstorms were the most expensive event for Austrian insurers in the last 20 years:

- Wiener Städtische Versicherung (Vienna Insurance Group) reported more than 48,000 claims and a total loss of almost EUR 200 million.¹⁴
- Oberösterreichische Versicherung (Upper Austrian Insurance) reported about 16,500 claims with more than EUR 160 million in insurance benefits for storm damage. This amount was three times more costly than the previous largest hailstorm event, “Wolfgang” in 2009, which caused about EUR 50 million in losses.¹⁵
- Agricultural insurer Österreichische Hagelversicherung reported that the severe hailstorms in Austria caused more than EUR 150 million in damages to agricultural crops.¹⁶

Belgium

2021 EXTREME WEATHER EVENTS

In July 2021, Belgium was severely impacted by torrential rainfall, which caused heavy flooding throughout the Ardennes region and in parts of Flanders. Rainfall totals from mid-June through mid-July were nearly equal to long-term precipitation averages (1991-2020) for the entire summer months.

On 13 and 14 July 2021, record-breaking precipitation was reported in:

- Jalhay: 271.5 mm accumulated precipitation.
- Spa: 192.4 mm accumulated precipitation in Mont Rigi (Waimes) and 189.0 mm in Neu-Hattlich (Eupen).

The rain moved north on 15 July, causing 78.0 mm of accumulated precipitation in Buizingen (Halle) over a 24-hour period. Heavy rains also fell in Wallonia on 24 and 25 July.¹⁷

HUMAN LOSS

At least 42 fatalities were attributed to the Belgian floods as of 29 July 2021.¹⁸

IMPACT ON INSURERS

Since the July 2021 floods in Belgium, insurers received more than 71,000 claims with damages amounting to over EUR 2.1 billion. In addition to homes and buildings, 6,602 cars were damaged in the floods. Although some cars were repaired, most were irreparably damaged by water.¹⁹

The Wallonia Region suffered the greatest damage to insured buildings, estimated between EUR 1.3 billion and 1.7 billion:

- Insurers will pay EUR 590 million and Wallonia will pay the balance with a five-year, interest-free loan backed by insurers.
- This agreement creates one point of contact for claims and enables insurers to settle quickly and pay 100% of the incurred losses to their clients.
- Prior to the 2021 July floods, state contracts capped insurers' losses at EUR 320 million. With the 2021 agreement, insurers are paying more than their state contracts dictate.²⁰

¹⁴ Vienna Insurance Group (3 January 2022). 2021 is a record year for Wiener Städtische in terms of storm damage. APA OTS. Retrieved 11 March 2022 from https://www.ots.at/presseaussendung/OTS_20220103_OTS0016/wiener-staedtische-verzeichnet-2021-rekordjahr-bei-unwetterschaeden.

¹⁵ Linz-Stadt (23 December 2021). "2021 was undoubtedly a year of extremes" – almost 160 million euros insurance benefits for storm damage. Retrieved 11 March 2022 from <https://www.tips.at/nachrichten/linz/wirtschaft-politik/554252-2021-war-zweifellos-ein-jahr-der-extreme-knapp-160-millionen-euro-versicherungsleistungen-fuer-unwetterschaeden>.

¹⁶ HV (29 July 2021). Hail Insurance: Climate Change Costs Livelihoods – 105 Million Euros in Damage. Retrieved 11 March 2022 from <https://www.hagel.at/presseaussendungen/hagelversicherung-der-klimawandel-kostet-existenzen-105-millionen-euro-schaden/>.

¹⁷ Meteo Belgie. Never Before Seen Floods in Belgium. Floods July 2021. Retrieved 11 March 2022 from <https://www.meteobelgie.be/klimatologie/nieuws/la-suite/2309-watersnood-juli-2021>.

¹⁸ HLN (29 July 2021). One of the last two missing persons found after floods in our country. Retrieved 11 March 2022 from <https://www.hln.be/binnenland/een-van-de-twee-laatste-vermiste-personen-na-overstromingen-in-ons-land-terugggevonden-a4a4c681/>.

¹⁹ Reinsurance News (11 November 2021). Belgium floods amount to €2.1 billion in damages. Retrieved 11 March 2022 from <https://www.reinsurancene.ws/belgium-floods-amount-to-e2-1bn-in-damages/>.

²⁰ De Tijd. Insurers pay a significantly larger share of flood damage. Retrieved 11 March 2022 from <https://www.tijd.be/ondernemen/financiele-diensten-verzekeringen/verzekeraars-betalen-fors-groter-deel-van-schade-overstromingen/10325476.html>.

Belgian retail fire insurance covers all material damage resulting from floods, except for residences built in risk areas as defined by the Belgian government gazette. This coverage also includes rebuilding preparation costs and temporary housing costs incurred during the construction period. Small and medium-sized enterprise fire insurance also covers flood risk on buildings.

Retail car insurance covers flood risk if the policy includes all-risk coverage. Flood damage to vehicles is covered via expanded car insurance, while commercial losses due to a halt or delay in services can be covered through commercial loss insurance.

AXA, one of the largest Belgian insurers, has added EUR 1.9 billion of specific European flood reinsurance to its natural catastrophe reinsurance programme for 2022 after the July 2021 flooding losses, as it shrank its European wind tower by 14% to EUR 2.5 billion.²¹

France

2021 EXTREME WEATHER EVENTS

- The July 2021 floods were moderate in France relative to the flooding in Germany and the Benelux countries. Some flooding occurred in the Northeast and particularly in the Lorraine region, where dozens of homes flooded along with many roads. The most severe damages were agricultural, resulting in a decline in crop yields. The French government declared the event a “natural catastrophe” in 240 municipalities and the State reinsurer Caisse Centrale de Réassurance (CCR) ranked it as “Moderate” (level 3 of 5).²²
- In early April 2021, an intense late deep freeze gripped most of France and became the nation’s most costly agricultural insurance event since the introduction of multi-risk climate crop insurance in 2005. This event caused significant damage to crops, affecting many vineyards and farms in 10 of the 13 regions of metropolitan France.
- While France did not experience severe drought and subsidence in 2021, these events have become more common, occurring in 2018 and 2020. Over the last 20 years, the CCR only ranked four events as “Extremely severe” (level 5 of 5), and three of them were droughts.

HUMAN LOSS

No fatalities were reported in France.

ECONOMIC IMPACT

The total cost of the July 2021 floods is still unknown but is expected to be moderate given the relatively low number of affected homes.

IMPACT ON INSURERS

- In France, flood insurance is mandatory for all fire contracts; therefore, the insurance penetration is very high. Because the July floods qualified as a “natural catastrophe,” the CCR reinsurance scheme applies and significantly mitigates insurance industry costs.
- In response to the April 2021 deep freeze, the State provided financial aid to farmers. In this context, a report ordered by the government on risk management in agriculture was issued in July 2021. This report recommends promoting the development of insurance for risks which are insurable and public intervention for extreme climate events. The Milliman white paper [La couverture des risques agricoles au sein de la ferme France \(milliman.com\)](#) provides more detail.²³

²¹ Insurance Insider (24 February 2022). Axa boosts European flood reinsurance cover amid treaty overhaul. Retrieved 11 March 2022 from <https://www.insuranceinsider.com/article/29f92lbktbcs96n7ozsow/axa-boosts-european-flood-reinsurance-cover-amid-treaty-overhaul>.

²² CCR (18 February 2022). Floods in the Northeast in July 2021. Retrieved 11 March 2022 from https://catastrophes-naturelles.ccr.fr/-/002126_inondationsnordestjuillet2021.

²³ Poncelot, V., Taillieu, F., d'Antin, H., & Ballard, F. La couverture des risques agricoles au sein de la ferme France. Milliman White Paper. Retrieved 11 March 2022 from <https://fr.milliman.com/fr-FR/insight/la-couverture-des-risques-agricoles-au-sein-de-la-ferme-france>.

Germany

2021 EXTREME WEATHER EVENTS

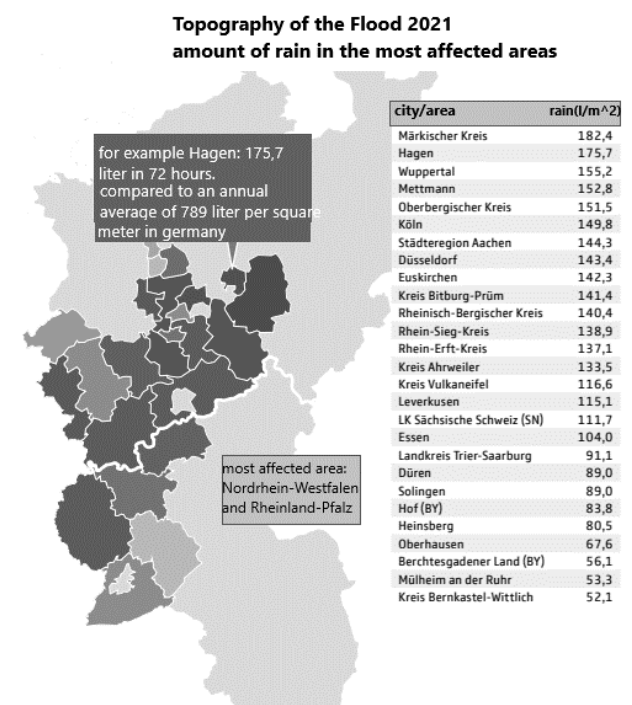
From 18 through 30 June 2021, severe thunderstorms, torrential rain and hail affected many regions in Baden-Württemberg, Rhineland-Palatinate, North Rhine-Westphalia, Saxony, Thüringen and Brandenburg:

- More than 50 litres of rain per square metre per hour fell in many areas.
- Thousands of vehicles and buildings were destroyed, and streets and cellars flooded.
- Cost estimates to repair the damages exceeded EUR 1 billion.

Less than two weeks later, on 12 July 2021, it started raining again and rain fell for eight consecutive days:

- The slow-moving, low-pressure system “Bernd” moved from France toward Germany from Bad Württemberg to Hessen, then to Saarland, then to the Eifel area.
- Rainfall totals reached as much as 240 litres per square metre.

FIGURE 1: GERMAN 2021 FLOOD DISASTER RAINFALL BY MOST AFFECTED AREAS²⁴



Source: Gesamtverband der Deutschen Versicherungswirtschaft, retrieved from <https://www.gdv.de/resource/blob/71294/ebaad3ff1563be2b92e0dd0ce4c0751c/download-naturgefahren-report-data.pdf>

One day later, on 13 July, the cities of Solingen, Hagen and Wuppertal flooded:

- The land was already saturated from the June storms and could not absorb the additional rainfall.
- Officials declared a state of emergency as highways flooded, cell phone towers were damaged, destroyed cars and caravans floated through flooded streets and hundreds of people died or went missing.

Damaged infrastructure hampered immediate rescue efforts and created a long, difficult road to recovery in the affected areas.²⁵ Four weeks later, highways and railway lines were still closed, leaving some areas inaccessible. People were not able to get to work and many local businesses closed, so volunteers worked to clean up the streets and help others with donations of food and clothing.²⁶

²⁴ GDV. Naturgefahrenreport 2021. Retrieved 11 March 2022 from <https://www.gdv.de/resource/blob/71294/ebaad3ff1563be2b92e0dd0ce4c0751c/download-naturgefahren-report-data.pdf>.

²⁵ NBC News (19 July 2021). Almost 200 dead, many still missing after floods as Germany counts devastating cost. Retrieved 11 March 2022 from <https://www.nbcnews.com/news/world/almost-200-dead-many-still-missing-after-floods-germany-counts-n1274330>.

²⁶ CEDIM Forensic Disaster Analysis (FDA) Group. Hochwasser Mitteleuropa, Juli 2021 (Deutschland). Retrieved 11 March 2022 from https://www.cedim.kit.edu/download/FDA_HochwasserJuli2021_Bericht1.pdf.

HUMAN LOSS

The devastating flood disaster caused more than 700 injuries and almost 200 deaths in Germany.²⁷ More than a month later, many lives had not returned to normal. After the initial shock subsided, many people needed psychological counselling, especially those whose homes were destroyed and who lost all their possessions. Hotlines were set up to help the victims deal with depression and, in some cases, suicidal thoughts.²⁸

ECONOMIC IMPACT

Munich Re, one of the world's leading reinsurers, estimates the total economic losses in Europe from the 2021 July flood disasters at EUR 46 billion, of which EUR 33 billion is in Germany.²⁹ However, it will take time to completely understand and quantify the total economic impact to the German economy. The hospitality and retail sectors were hit particularly hard, after already suffering major financial losses due to COVID-19 lockdowns. Ironically, the rebuilding of homes and infrastructure could have a positive impact on the country's gross domestic product (GDP) growth moving forward.³⁰

IMPACT ON INSURERS

The German Insurance Association (GDV) estimates the insured property damage caused by the July 2021 floods in Germany at EUR 7 billion. This makes it the most expensive natural disaster for German insurers in the last 50 years. The GDV attributes about:

- EUR 6.5 billion to losses of residential buildings, household contents and businesses.
- EUR 450 million to motor vehicles losses.³¹
- EUR 1.3 billion to more than 400 "major losses." A major loss is defined as more than EUR 1 million for a single policyholder. Major losses are most common in the commercial and industrial sectors when buildings, machinery and equipment are damaged. The July 2021 floods created several major losses greater than EUR 20 million, for example in the hotel, chemical production and metal processing industries.³²

Additional estimates of expected loss burdens to insurers include the following:

- In September 2021, BaFin, Germany's Federal Financial Supervisory Authority, surveyed 136 German property and casualty insurers and 28 reinsurers impacted by the flood disaster. BaFin raised expected gross loss estimates for primary insurers to EUR 8.2 billion based on survey results.³³
- In September 2021, Hannover Re estimated that the German flood disaster will cost insurers up to EUR 10 billion. Automobile damage was estimated at two to three times higher than normal average losses, and uncertainty around whether homes can be repaired or need to be demolished contributed to the increased costs.³⁴ Hannover Re estimates that its own costs will amount to EUR 200 million to EUR 250 million.³⁵

Following this significant event, some insurers have reviewed their catastrophe cover for flood.

²⁷ NBC News, op cit.

²⁸ SWR (27 August 2021). Psychological help for the victims of the floods in the Ahr Valley. Retrieved 11 March 2022 from <https://www.swr.de/swr/aktuell/rheinland-pfalz/koblenz/psychologisch-hilfe-fuer-flutopfer-ahrtal-100.html>.

²⁹ Merkur.de (19 October 2021). Flood disaster could become even more expensive for insurers. Retrieved 11 March 2022 from <https://www.merkur.de/wirtschaft/flutkatastrophe-koennte-fuer-versicherer-noch-teurer-werden-zr-91058492.html>.

³⁰ ING (18 July 2021). Germany: Economic and political impact of the floods. Retrieved 11 March 2022 from <https://think.ing.com/articles/germany-economic-and-political-impact-of-the-floods>.

³¹ Versicherungs Money Focus (27 August 2021). Flood: GDV significantly raises loss forecast. Retrieved 11 March 2022 from https://versicherungsprofi.online/branche/assekuranz/flut-gdv-korrigiert-schadenprognose-deutlich-nach-oben_01399/.

³² Versicherungsbote (15 September 2021). GDV: July flood caused more major losses than ever before. Retrieved 11 March 2022 from <https://www.versicherungsbote.de/id/4903294/GDV-Juli-Flut-verursachte-so-viele-Grossschaden-wie-noch-nie/>.

³³ BaFin (15 September 2021). Flood damage: Still no threat to existence. Retrieved 11 March 2022 from https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Meldung/2021/meldung_210915_Rueckversicherer_Flutschaeden.html.

³⁴ SPIEGEL Economy (18 October 2021). Hannover Re expects costs of up to 10 billion euros for Insurers. Retrieved 11 March 2022 from <https://www.spiegel.de/wirtschaft/flutkatastrophe-hannover-rueck-erwartet-bis-zu-10-milliarden-euro-kosten-a-f3a05ef1-4329-445d-8d6b-56fd7c302c28>.

³⁵ NDR (5 August 2021). Despite flood damage: Hannover Re sticks to its profit forecast. Retrieved 11 March 2022 from https://www.ndr.de/nachrichten/niedersachsen/hannover_weser-leinegebiet/Trotz-Flutschaeden-Hannover-Rueck-haelt-an-Gewinnprognose-fest,aktuellhannover9144.html.

Claims reporting and settlement

The GDV reported that:

- Insurers paid approximately one-fifth of flood claims, about EUR 1.5 billion, within a few months of the event.
- About a month after the flood disaster, insurers had already paid advances of about EUR 700 million to their customers—with about EUR 500 million attributed to losses in the private sector such as residential buildings, household contents and motor vehicles, and almost EUR 200 million attributed to commercial risks.³⁶

Italy

2021 EXTREME WEATHER EVENTS

In 2021, severe weather impacted every region of Italy. For example, on 4 October 2021, the entire country was hit by 20 severe weather events in one day, including tornadoes, hailstorms, windstorms and torrential rainfall, which caused damage to cities and rural areas, primarily in the northwestern region. The storms devastated fields, pastures, stables and agricultural vehicles; blocked roads; caused landslides; and broke three national climate records within a few hours.

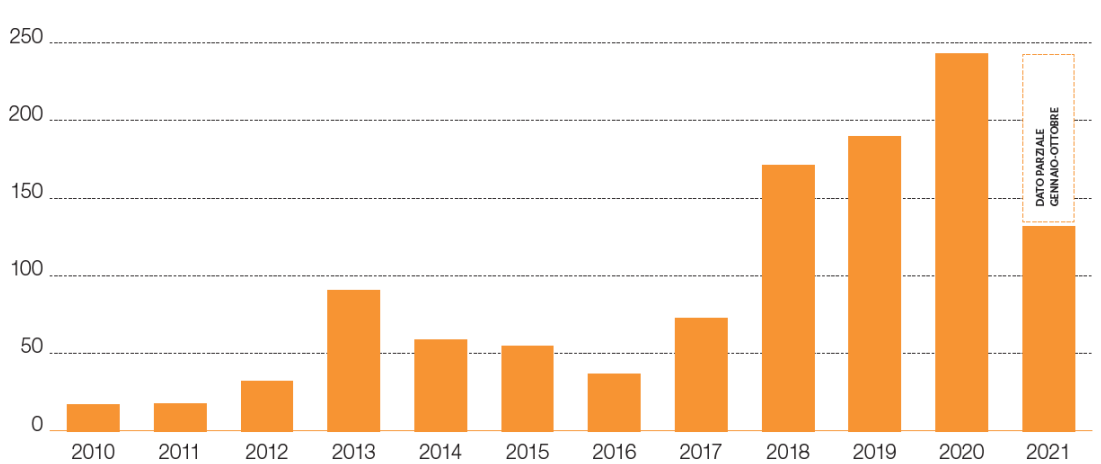
- In the municipalities of Urbe and Montenotte Inferiore, 368 mm of rain fell in three hours and 490 mm of rain fell in six hours.
- In Rossiglione 733 mm of rain fell in 12 hours.³⁷

Extreme weather event trends

From 2010 to 2021, the number of extreme weather events in Italy trended upward, as shown in the chart in Figure 2.

- The number of extreme weather events tripled from 2017 to 2020
- From January to October 2021, 130 extreme weather events were reported

FIGURE 2: NUMBER OF EXTREME WEATHER EVENTS IN ITALY FROM 2010 TO OCTOBER 2021³⁸



Fonte: Osservatorio Città Clima, Legambiente 2021

³⁶ GDV (18 August 2021). Flood disaster in Germany: Insurers make advances of 700 million euros. Retrieved 11 March 2022 from <https://www.gdv.de/de/medien/aktuell/flutkatastrophe-in-deutschland-versicherer-leisten-vorschuesse-von-700-millionen-euro--69718>.

³⁷ The Local (6 October 2021). Italy hit by 20 "severe weather events" in a day as Liguria sees record rainfall. Retrieved 11 March 2022 from <https://www.thelocal.it/20211006/italy-hit-by-20-severe-weather-events-in-a-day-as-liguria-region-sees-record-rainfall/>.

³⁸ LEGAMBIENTE. Rapporto Osservatorio Città-Clima 2021. Retrieved 11 March 2022 from <https://www.legambiente.it/wp-content/uploads/2021/11/Report-OsservatorioCittaClima2021.pdf>.

Floods in Italy: January 2010 through October 2021

The most common extreme weather events in Italy are floods:

- Prior to 2018, Italy reported about 10 to 20 flood events per year.
- In 2018 and 2019, Italy reported about 80 flood events per year.
- In 2020, Italy reported about 100 flood events.
- Between January and October 2021, Italy reported 85 flood events, indicating that Italy was about to report more flood events in 2021 than any previous year.

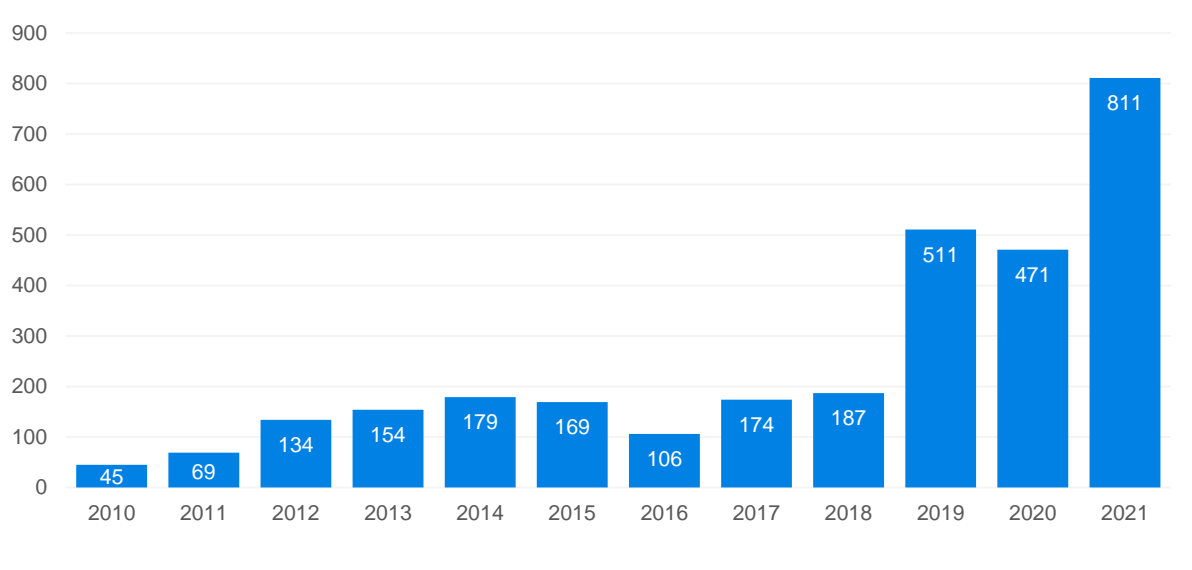
Large hail events in Italy: January 2010 through October 2021

Large hail events are the second-most common extreme weather event in Italy. The European Severe Weather Database defines large hail as the falling of hailstones having a diameter (in the longest direction) of 2.0 cm or more and/or smaller hailstones that form a layer of 2.0 cm thickness or more on flat parts of the earth's surface.³⁹

The chart in Figure 3 shows that:

- Prior to 2019, Italy reported less than 200 large hail events per year.
- In 2019 and 2020, Italy reported about 500 large hail events per year.
- Between January and October 2021, Italy reported 811 large hail events, surpassing 2019's record-breaking number of hail events.

FIGURE 3: NUMBER OF REGISTERED LARGE HAIL EVENTS IN ITALY FROM 2010 THROUGH OCTOBER 2021⁴⁰



HUMAN LOSS

From January to October 2021, nine people died in Italy due to extreme weather events. Others were injured or suffered property damage. Specifically:⁴¹

1. Rapallo (Genova): 120 mm of rain fell in eight hours on 11 April, damaging roads and homes.
2. Pantelleria (Trapani): Windstorm on 10 September caused two deaths and four injuries.
3. Rossiglione (Genova): 4,740 mm of rain fell in 12 hours on October 4, damaging roads and homes.
4. Sicilia: *Medicane* on 28 October caused three deaths. In meteorology, the Mediterranean tropical cyclone is also referred to as a "medicane," from the fusion of the words "Mediterranean hurricane."

³⁹ European Severe Weather Database. Definitions. Retrieved 11 March 2022 from https://www.eswd.eu/cgi-bin/eswd.cgi?action=showdefinitions&lang=en_0.

⁴⁰ LEGAMBIENTE. Rapporto 2020. Retrieved 11 March 2022 from https://cittaclima.it/wp-content/uploads/2020/11/CC_Rapporto_2020-def.pdf.

⁴¹ LEGAMBIENTE, Rapporto Osservatorio Città-Clima 2021, op cit., pages 15 and 27.

From 2010 to 2020, 261 deaths were attributed to extreme weather events in Italy. Historically, an increase in floods has not correlated with an increase in victims. Construction innovations and newer preventive measures might account for the substantial reduction in the number of flood-related deaths since the early 1980s. However, flood-related deaths increased significantly from 2009 to 2019, which could be attributed to an increase in extreme weather events.

ECONOMIC IMPACT

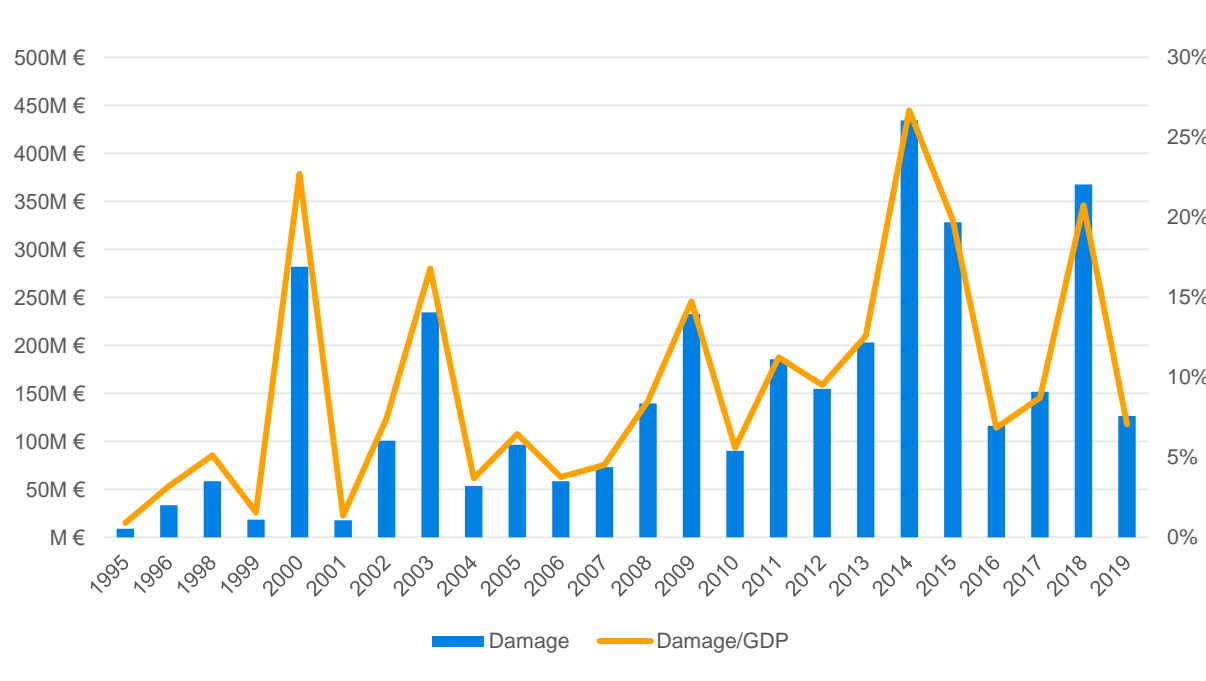
Italy's agriculture industry association estimates that the industry lost EUR 2 billion in 2021 due to extreme weather events⁴²

The Italian government spends about EUR 1.5 billion to manage emergencies related to extreme weather events, but only about EUR 300 million to mitigate weather risks—a 1-to-5 ratio of spending for prevention and damage repair.⁴³

For historical context, Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) compared Italy's flood losses with the country's GDP from 1995 through 2019, as shown in the chart in Figure 4.

- From 2006, the trend shows that the cost of flood damage was more than 5% of Italy's annual GDP.
- In 2014, floods losses amounted to 27% of Italy's GDP.
- Very high losses relative to GDP are not unusual in Italy. For example, the 1996 flood losses amounted to 251% of total GDP and 1972 flood losses amounted to 112% of total GDP.

FIGURE 4: ECONOMIC COSTS OF FLOODS IN ITALY COMPARED TO GDP (1995-2019)⁴⁴



IMPACT ON INSURERS

The Italian Association of Insurers (ANIA) estimates that only about 2% of properties in Italy are insured in 2021. The lack of coverage leaves the Italian government primarily responsible for the cost of extreme weather events, which has led to rebuilding delays, businesses closing and property abandonment.⁴⁵

⁴² The Local (6 October 2021), op cit.

⁴³ LEGAMBIENTE, Rapporto Osservatorio Città-Clima 2021, op cit.

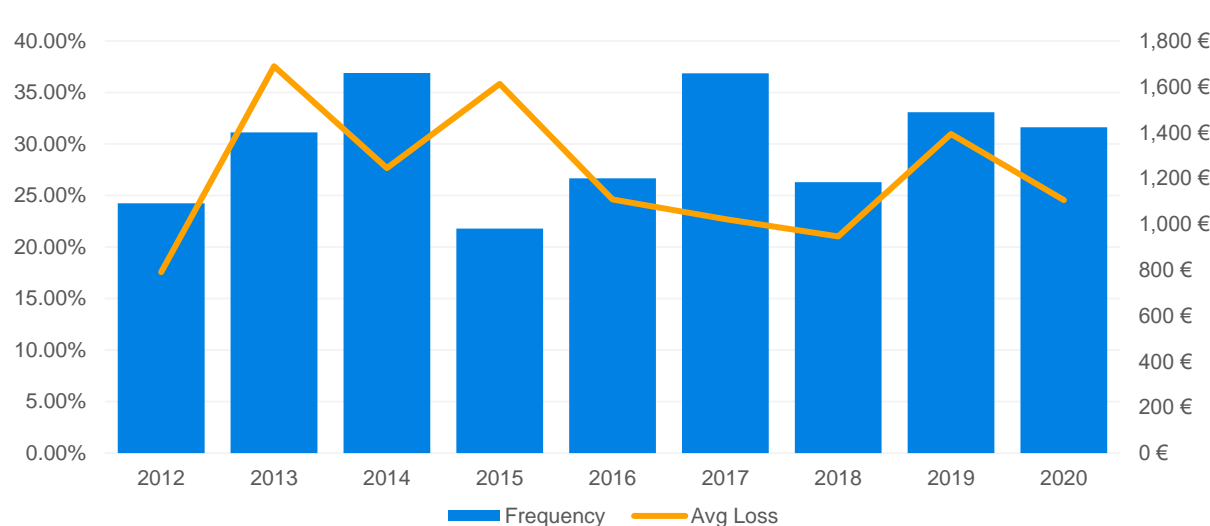
⁴⁴ ISPRA. Reports Yearbook of Environmental Data. Retrieved 11 March 2022 from https://annuario.isprambiente.it/sys_ind/report/html/404.

⁴⁵ ANIA. La gestione del rischio catastrofale e stima dei danni al patrimonio abitativo italiano. Retrieved 11 March 2022 from http://www.ordineattuari.it/media/6054/ANIA_280312_CONFORTI_ROMA_094.pdf.

Milliman analysed historical ANIA data⁴⁶ to show the average cost and claims frequency of hail events in recent years for multi-risk policies, as shown in the chart in Figure 5. The analysis indicates that:

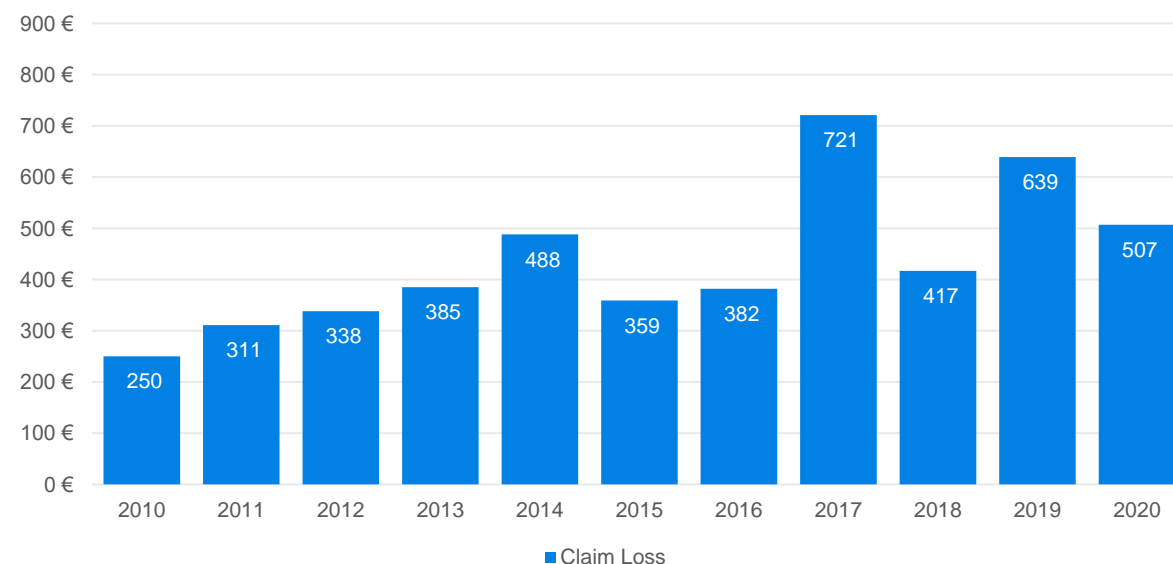
- An increase in the number of claims does not always correlate with an increase in costs, except in 2013 and 2019.
- Overall, frequency and costs have been similar in recent years.
- Although 2021 data is not yet available, Milliman expects these trends to continue.

FIGURE 5: HAIL CLAIMS FREQUENCY AND AVERAGE LOSS FOR MULTI-RISK POLICIES



Additionally, ANIA provides annual income statements for claims losses that occurred from 2010 to 2020. Although 2015 and 2016 were countertrend years, insurer losses due to hail events since 2010 follow an increasing trend, as shown in the chart in Figure 6.⁴⁷

FIGURE 6: HAIL LOSSES FOR MULTI-RISK POLICIES (CLAIM LOSSES IN MILLION)



⁴⁶ ANIA. Historical statistics on hail for multi-risk policies. Data retrieved 9 December 2021 from <https://www.ania.it/publicazioni/-/categories/52492>.

⁴⁷ Ibid.

Luxembourg

2021 EXTREME WEATHER EVENTS

Institute MeteoLux, the Luxembourgian meteorological institute, reported that:

- Torrential rains on 14 and 15 July 2021 broke two monthly rainfall records.
- The maximum precipitation in 12 hours and 24 hours reached accumulations of 74.2 mm and 79.4 mm, respectively, breaking the previous records set on 22 July 2016 of 60.4 mm and 70.6 mm.⁴⁸

HUMAN LOSS

Emergency services received more than 1,000 calls for help and more than 150 people were evacuated from their homes. No fatalities were reported.

ECONOMIC IMPACT

Days after the floods, the Luxembourg Government Council announced an aid package worth EUR 50 million would be made available to support victims of the flood. This amount was meant to reimburse damages not covered by insurers. The package included financial assistance for households, businesses and municipalities, but also allowed affected companies to apply for reimbursement of employee wages.⁴⁹ Infrastructural repairs were covered as well. In August 2021, the government pledged to double the aid package to EUR 100 million if required.⁵⁰

IMPACT ON INSURERS

- Fire insurance covered damages to houses and buildings, but only in zones which are classified as "at risk."
- Luxembourgian insurance broadly covers floods including backup of public sewers, overflows of watercourses following atmospheric precipitation, landslides and subsidence of land due to rain.
- Flood damage to cars is only covered by all-risk car insurance policies.

Total estimated insured damage is more than EUR 120 million, making this extreme weather event the costliest disaster for insurers in Luxembourg's history. More than 6,000 homes and 1,000 cars were damaged. Most of the cars were destroyed beyond repair.⁵¹

The Netherlands

2021 EXTREME WEATHER EVENTS

- The heavy rainfall of July 2021 also affected the Netherlands, primarily in the provinces of Limburg and Noord-Brabant. Apart from local precipitation, the Netherlands were also severely impacted by the heavy rainfall in Belgium, Luxembourg and Germany, which flowed downstream through rivers to the Netherlands.
- The rivers Geul and Gulp flooded, leading to damages in the counties of Heerlen, Kerkrade, Landgraaf, Gulpen, Meerssen and Valkenburg.
- Valkenburg became the epicentre of the floods and the city centre flooded on 14 and 15 July. The Maas (Meuse) River's water level reached a record high but did not flood due to active water management. If the Maas River had flooded, damages would have increased exponentially.⁵²

⁴⁸ Floodlist (17 July 2021). Luxembourg: Dozens Evacuated After Record Rainfall Causes Rivers to Break Banks. Retrieved 11 March 2022 from <https://floodlist.com/europe/luxembourg-floods-july-2021>.

⁴⁹ Chronicle.lu (16 July 2021). Luxembourg Declares Natural Disaster, Announces €50m in Aid for Flood Victims. Retrieved 11 March 2022 from <https://chronicle.lu/category/at-home/37224-luxembourg-declares-natural-disaster-announces-eur50m-in-aid-for-flood-victims>.

⁵⁰ RTL Today (25 August 2021). Government doubles flood aid to €100 million; Covid situation stable. Retrieved 11 March 2022 from <https://today.rtl.lu/news/luxembourg/a/1776065.html>.

⁵¹ ACA (21 July 2021). 120 millions € de dommages suite aux inondations : la catastrophe la plus coûteuse de l'histoire de l'assurance luxembourgeoise. Retrieved 11 March 2022 from https://www.aca.lu/media/60fa5ae43a0b7_cp_aca_inondations_2021_2.pdf.

⁵² Wikipedia. Floods in Europe in July 2021 – Netherlands.. Retrieved 11 March 2022 from https://nl.wikipedia.org/wiki/Overstromingen_in_Europa_in_juli_2021_-_Nederland.

HUMAN LOSS

No fatalities were reported in the Netherlands. While the country experienced extreme rainfall, its towns were not entirely submerged and not a single person died.

ECONOMIC IMPACT

Initially, total material damage in the Netherlands attributed to the floods was estimated between EUR 350 million and EUR 600 million. Since then, estimates up to EUR 1.8 billion have been published.⁵³

IMPACT ON INSURERS

Despite delays created by complex water damages, scarce building resources and the COVID-19 pandemic, insurers fully settled about 80% of private claims and about 60% of business claims related to the Limburg floods by December 2021:

- In total, insurers received approximately 25,000 claims from Limburg and Brabant, with an estimated total insured damage of EUR 160 million to EUR 250 million.
- Claims filed for damages to personal homes and cars accounted for the vast majority of total claims, and the rest were business-related claims.⁵⁴
- Additionally, citizens, companies, associations or foundations with claims that exceeded policy limits or were excluded from coverage could file with the government under the Reimbursement for Damages Due to Disasters Act.⁵⁵

Although private insurance does not by default fully cover flood losses, many Dutch insurers tried to generously settle claims. To expedite the process, insurers sent teams of claims handlers to the towns that were severely impacted. These experts helped their policyholders avoid additional losses, answered questions and assessed monetary damages.

In the Netherlands, larger companies are typically insured via "beurs" (broker) policies, where risk is borne by multiple insurers. Under these contracts, policy conditions are more strictly enforced by the leading insurer. In 2021, some beurs clients were surprised to learn that their policies did not cover floods. Government officials and the media publicly complained about this lack of transparency, and some insurers responded by paying 2021 flood claims.

The July 2021 floods caused broader discussion among insurers and between insurers and citizens regarding what can and should be covered going forward. Previously only one insurer offered insurance against flooding of "secondary weirs." After the 2021 floods, this coverage was added to standard fire insurance by two other large insurers. Breaches of primary weirs and dikes are currently not insured, and in general are considered uninsurable due to the Netherlands location next to the sea with several large rivers and densely populated areas at or below sea level.

To raise awareness, the Netherlands Authority for the Financial Markets (AFM) published a report in October 2021 explaining the increased risk of flood damage and other extreme-weather risks to:

- Warn consumers that these risks are not always (fully) covered by insurance
- Encourage insurers to be more transparent in their communications about policy conditions
- Petition the government to work with insurers to actively search for solutions to insure climate-related damage risks⁵⁶

⁵³ EMW, "Hoogwater 2021 Feiten en Duiding." Retrieved 21 November 2021 from <https://www.tweedekamer.nl/downloads/document?id=096991fc-8f54-41e4-8bba-6e94aed53293&title=Samenvatting%20ENW-rapport%20%27Hoogwater%202021.%20Feiten%20en%20Duiding%27%20d.d.%2020%20september%202021.pdf>.

⁵⁴ Dutch Association of Insurers. Flood Limburg. Retrieved 11 March 2022 from <https://www.verzekeraars.nl/verzekeringsthemas/nieuwe-risicos/duurzaamheidklimaat/klimaat/watersnood-limburg>.

⁵⁵ Business.gov.nl. Reimbursement for damages due to disasters. Retrieved 11 March 2022 from <https://business.gov.nl/subsidy/reimbursement-damages-disasters/>.

⁵⁶ AFM (28 October 2021). Damage caused by climate change increasingly uninsurable. Retrieved 11 March 2022 from <https://www.afm.nl/nl-nieuws/2021/oktober/schade-klimaatverandering-vaker-onverzekeraar>.

United Kingdom

2021 EXTREME WEATHER EVENTS

Storm Christoph

Storm Christoph brought strong winds, heavy rain and snow to the UK between 19 and 21 January 2021.

- The most intense rainfall occurred over north Wales and northern England, bringing localised flooding to many areas. The Environment Agency (EA) and Natural Resources Wales (NRW) issued flood warnings across much of the two countries, including severe flooding warnings on the River Mersey, River Bollin and the English and Welsh River Dee. Approximately 3,000 people were evacuated from their homes.
- Impact to property was not as severe as feared, with estimates ranging from 400 to 600 residential properties and about 100 commercial premises affected. The EA reported that 38,000 properties were protected by flood defences, although many defences, including those along the River Mersey in Didsbury, came within centimetres of being overtopped during the event.
- The Met Office reported that 50 to 100 mm of rain fell widely across Wales and northwest England, with over 100 mm across upland areas of Wales, southwest England, the Lake District and the Pennines. At several locations more than 100% of the January monthly average rainfall fell between 18 and 20 January.⁵⁷

Storm Darcy

The UK experienced a week of severe winter weather from 7 to 13 February 2021, with easterly winds drawing a bitterly cold airflow from eastern Europe. Storm Darcy brought some strong winds and heavy snow to parts of southeast England on 7 February, while persistent snow showers resulted in significant accumulations across eastern England and Scotland. In the wake of the snowstorm, Braemar recorded -23°C on 12 February, the lowest temperature in the UK since 1995.⁵⁸

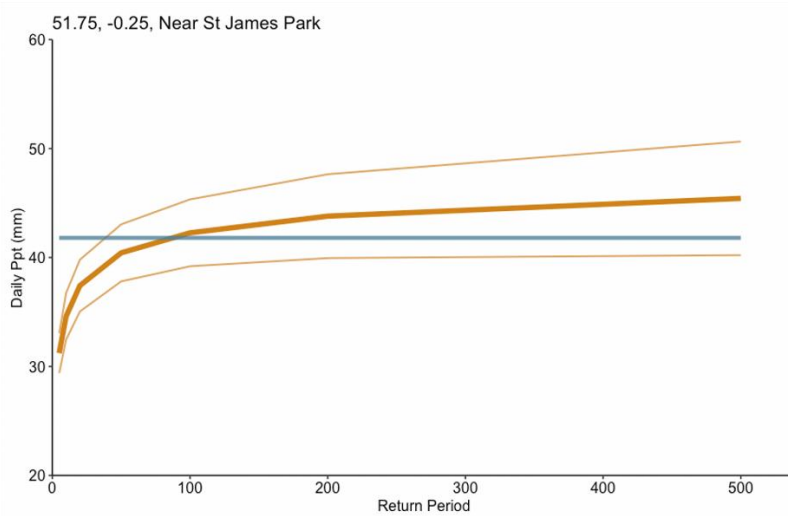
July 2021 floods

The flooding in July 2021 was unusual as it resulted from several isolated days of intense rainfall across East and Southeast England:

- On 9 July 2021, nearly 90 mm of rain fell in Peterborough while parts of Norwich saw 50 mm of rain—nearly two months of rain in two hours.
- On 12 July 2021, nearly 76 mm of rain fell in 90 minutes in parts of London, resulting in 120 Kensington and Chelsea residents being evacuated from their homes. By lunchtime on 12 July, eight underground lines had been suspended and multiple underground stations had been closed, including Euston Station. The London Fire Brigade reported over 1,000 calls relating to flooding. Kew, in southwest London, experienced 47.8 mm of rainfall in a single hour, compared to an average monthly rainfall of 44.5 mm, which makes it Kew's wettest day since 6 July 1983.
- Just five days later, on 17 July 2021, 76 mm of rain fell in 90 minutes, causing floods along Portobello Road, with flood levels reaching at least 0.45 metres.
- Torrential rain on 25 July 2021 deluged several locations around the south of England. Bethersden in Kent received 48.5 mm within one hour, between 3 p.m. and 4 p.m., while Ryde, on the Isle of Wight, received around 38.5 mm. Several roads and underground stations in London were affected. The wettest area in London was St James's Park, which recorded 41.8 mm of rainfall in a day, equal to the total average monthly rainfall for July in London.
- As shown in Figure 7, a General Pareto Distribution curve was fitted to historical records available for the closest location (51.75, -0.25) to St James's Park, London. The historical rainfall records were obtained from gridded rainfall between 1979 and 2020 from the NOAA Physical Science Laboratory Climate Prediction Center (CPC) Global Unified Gauge-Based Analysis of Daily Precipitation data set. Based on a daily total of 41.8 mm at St James's Park, the estimated return period based on rainfall intensity is approximately 50 to 100 years.

⁵⁷ JBA Risk Management. Storm Christoph. Retrieved 11 March 2022 from <https://www.jbarisk.com/flood-services/event-response/storm-christoph/>.

⁵⁸ Met Office. Severe winter weather and storm Darcy, February 2021. Retrieved 11 March 2022 from https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2021/2021_02_low_temperatures.pdf.

FIGURE 7: RETURN PERIODS FOR DAILY RAINFALL BASED ON HISTORICAL RECORDS NEAR ST JAMES'S PARK

Source: JBA Risk Management Ltd, Figure 1 retrieved from <https://www.jbarisk.com/flood-services/event-response/a-retrospective-look-at-summer-2021-london-flash-floods/>

- Following the floods on 25 July, two hospitals and eight tube stations were closed for a day. Among those were Whipps Cross Hospital, which had to evacuate 100 patients due to a power failure, and Pudding Mill Lane DLR station, which saw flood waters reach 0.4 to 0.5 metres deep. Other areas that were flooded include Nine Elms Park, Hampstead, Upper Leytonstone and Hackney Wick.⁵⁹

ECONOMIC IMPACT

Londoners have seen their homes "wrecked" and belongings "destroyed" after the July 2021 flash floods overflowed the capital's roads and poured into properties. Damage to businesses, infrastructure and residential buildings was estimated in the millions of pounds after a month's worth of rain fell in just over an hour.⁶⁰

Historically, floods have caused billions in economic damages in the UK:

- The flood events that occurred during the 2013-2014 winter months incurred total economic damages of approximately GBP 1.3 billion.
- The winter flood events of 2016 (following storms Desmond, Eva and Frank) caused an estimated GBP 1.6 billion in damages.
- The flooding of summer 2007 occurred after one of the wettest May and June periods since records began in 1766. Over 55,000 homes in the Midlands and Home Counties were flooded, with losses totalling GBP 3.2 billion in economic damages.
- The economic cost of flooding in 2019 and 2020 was estimated to be GBP 78 million. The cost would have been GBP 2.1 billion higher without flood defences. This emphasises the importance of maintaining flood defences across the UK.

In 2020 the Environment Agency announced an investment in flood defences (for both capital and revenue) of GBP 5.2 billion, creating approximately 2,000 new flood and coastal defences to improve protection to 336,000 properties in England by 2027. However, flooding remains a significant risk in the UK.⁶¹

Low-income households are amongst the most at risk to flooding and the detrimental financial consequences. They are eight times more likely to live in tidal floodplains than affluent households and 61% of low-income renters do not have home contents insurance, leaving them more susceptible to financial shock.⁶²

⁵⁹ JBA Risk Management. A retrospective look at London surface water flash floods. Retrieved 11 March 2022 from <https://www.jbarisk.com/flood-services/event-response/a-retrospective-look-at-summer-2021-london-flash-floods/>.

⁶⁰ Metro (13 July 2021). London floods cause millions in damage after "biblical" storms hit city. Retrieved 11 March 2022 from <https://metro.co.uk/2021/07/13/tube-lines-suspended-after-flash-flooding-in-london-14919615/>.

⁶¹ JBA Risk Management (May 2021). Modelling the Impact of Spending on Defence Maintenance on Flood Losses. Retrieved 13 March 2020 from <https://www.abi.org.uk/globalassets/files/publications/public/flooding/modelling-the-impact-of-spending-on-defence-maintenance.pdf>.

⁶² Energy and Climate Intelligence Unit. Flood risk and the UK: How will flood risk to the UK change in future – and are we prepared? Retrieved 13 March 2022 from <https://eciu.net/analysis/briefings/climate-impacts/flood-risk-and-the-uk>.

HUMAN LOSS

No fatalities were reported in the UK due to 2021 extreme weather events. However, there is an impact on human health, including mental health. Government research found that people who experience extreme weather events such as storms or flooding are 50% more likely to suffer from mental health problems, including depression and anxiety, while a quarter of people who have been flooded still live with these issues at least two years after the event.⁶³

IMPACT ON INSURERS

PwC estimates losses from Storm Christoph at between GBP 80 million and GBP 120 million. Homeowners whose properties flooded will not necessarily see an increase in their flood premiums when their policies renew, because Flood Re charges a fixed premium for the flood element of home insurance for properties built before or during 2009.⁶⁴

Insurance data specialist PERILS estimated the event to be less than a EUR 200 million property market loss.⁶⁵

The aggregate insured losses from the 2021 July floods are yet to be reported and are expected to be more than GBP 100 million:

- Allianz and LV announced losses of GBP 15 million and GBP 7 million, respectively.⁶⁶
- PERILS has estimated an industry loss of GBP 264 million.⁶⁷

Estimating the impact of floods

Urban flash flooding, or surface water flooding, occurs after a heavy downpour of rain that hits the ground faster than it can drain or flow away. As a result, water builds up and develops the potential to flood properties.

Estimating the realistic impact of urban flash flooding is difficult prior to the development of claims because:

- Flash flooding typically occurs in disconnected areas where there are depressions in the ground or the drainage system is overwhelmed, making the creation of a footprint challenging.
- Basement flooding is often not seen in overhead imagery or in the media and only becomes apparent when a claim is made.

The underwriting and pricing of the overwhelming majority of flood insurance in the UK relies on output from broad-scale nationwide flood maps. Flood maps indicate areas of increased surface water flood risk, but it is much more difficult to account for local features which can significantly impact a property's flood risk. For example, some of the 2021 London flooding was driven by local features such as boundary walls, blocked drains, drain backup and basements. In some areas, like Portobello Road, flood hazard maps did not entirely capture the areas that flooded. In these locations, most claims were from properties with basements and localised features not captured in broad-scale mapping.⁶⁸

Reasons for the large losses in London

- **Basements.** As a result of high property prices and a large number of Georgian and Victorian homes, London has a significantly higher percentage of properties with occupied basements than other areas in the UK. Additionally, London is renowned for multilevel basements, which often store high-value items that can lead to multimillion-pound claims when damaged. Both residential and commercial occupants often store valuable belongings, stock or equipment below ground, and basement flooding is likely to be deep, long-lasting and expensive to clean up.

London also has residential apartments at basement level, which can be dangerous as evidenced by the 2021 New York City floods where 11 people lost their lives in basement apartments. To further complicate insurance matters, basements are invisible from above so they do not appear in the height map data used to model flood risk, making it very difficult to represent this risk in flood maps.⁶⁹

⁶³ Ibid.

⁶⁴ Insurance Business (25 January 2021). Revealed: Estimated insurance losses from Storm Christoph. Retrieved 13 March 2022 from <https://www.insurancebusinessmag.com/uk/news/breaking-news/revealed-estimated-insurance-losses-from-storm-christoph-244464.aspx>.

⁶⁵ PERILS loss data. Retrieved 13 March 2022 from <https://www.perils.org/losses>.

⁶⁶ JBA Risk Management. A Retrospective Look at London Surface Water Flash Floods. Retrieved 13 March 2022 from <https://www.jbarisk.com/flood-services/event-response/a-retrospective-look-at-summer-2021-london-flash-floods/>.

⁶⁷ PERILS loss data, op cit.

⁶⁸ JBA Risk Management, A Retrospective Look at London Surface Water Flash Floods, op cit.

⁶⁹ Ibid.

- **Impermeable surfaces.** London properties are highly susceptible to surface water flooding due to a predominance of impermeable surfaces that increase rainfall runoff. Trends that advocate moving from gardens to paving, and from tarmac to concrete surfaces, further increase surface water runoff.
- **Ageing drainage system.** Standard design and maintenance of drainage systems vary by location and nationwide data on drainage capacity is not available. However, within many cities, the design and construction of drainage system infrastructure lagged population growth. Inner London's "Victorian" drainage system was designed for a city of 4 million, but now serves 9 million residents. This network is at 80% capacity in dry weather, so its capacity is highly constrained during heavy rainfall. Surface water flooding is most likely to occur when the drainage system fails, whether it is due to the drainage reaching capacity, or individual drains being blocked by debris. Furthermore, if the drainage system reaches capacity, internal pressure can lead to drainage backup in certain areas or within properties.

Claims reporting and settlement

Parametric insurtech firm FloodFlash quickly issued pay-outs to policyholders affected by flooding from Storm Christoph, in many cases on the same day that the flooding occurred. The fastest claims took just nine hours and 44 minutes from the property flooding to the client receiving the full settlement in their account, which FloodFlash says is a new catastrophe claims record. FloodFlash internet of things (IoT) sensors began to detect floods on Wednesday, 20 January, triggering claims on parametric policies across the country, which are based on a pre-agreed depth of flooding. FloodFlash also set the previous record for fastest property flood claims following Storm Ciara in February 2020, at 26 hours and 15 minutes.⁷⁰

Sedgwick, one of the UK's leading loss adjusters, received over 2,000 flood claims across 12 July, 17 July and 25 July. Many of these are classified as large claims.⁷¹

Outlook for the future

OVERVIEW

The European extreme weather events in 2021 reaffirmed that the costs of climate change, both human and financial, are increasingly stark. To combat this global challenge, European Union countries and the United Kingdom have already agreed to cut their collective greenhouse gas emissions from 1990 levels by 55% by 2030, with the aim of being carbon-neutral by 2050.

The European Central Bank recently analysed three scenarios of transitioning to a zero-carbon eurozone by 2050:

- 1) The best-case scenario is an orderly transition that meets the Paris Agreement targets and contains global warming to 1.5°C compared with the preindustrial era. Under this scenario, the average eurozone company would have slightly less profitability over the next four or five years because of the cost of complying with green policies such as carbon taxes and replacing technologies. But then the benefits of the transition would kick in. This scenario limits the disruption to our economies, businesses and livelihoods in the long run.
- 2) The medium scenario is a disorderly transition in which countries delay taking action until 2030, and then have to make abrupt and costly policy changes to meet the Paris Agreement target of containing warming to 2°C. Under this scenario, the effects of climate change would be concentrated in certain geographical areas and sectors, and company profitability would drop more than 20% by 2050.
- 3) The worst-case scenario is if no actions are taken to mitigate climate change before 2050 and the costs from natural disasters are extremely high. Under this scenario, the impact on GDP would be limited to 2% by 2090, but company profitability would drop by 40%. The impact would be the most severe for companies located in vulnerable geographical areas, and for banks with portfolios that are particularly concentrated in countries most affected by natural disasters.⁷²

⁷⁰ Reinsurance News (25 January 2021). FloodFlash pays Storm Christoph claims on same day. Retrieved 13 March 2022 from <https://www.reinsurancene.ws/floodflash-pays-storm-christoph-claims-on-same-day/>.

⁷¹ JBA Risk Management, A Retrospective Look at London Surface Water Flash Floods, op cit.

⁷² European Central Bank (September 2021). ECB economy-wide climate stress test. Retrieved 13 March 2022 from <https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op281~05a7735b1c.en.pdf>.

A heavy precipitation event that used to occur once every 10 years between 1850 and 1900 now likely occurs 1.3 times and is 6.7% wetter; under a 2°C scenario this will likely increase to 1.7 times and 14.0% wetter. An agricultural drought event that used to occur once every 10 years between 1850 and 1900 now likely occurs 1.7 times, and under a 2°C scenario will likely increase to 2.4 times.⁷³

Generally speaking, countries in the southern European regions are more susceptible to a higher risk of extreme heat waves and wildfires, while northern European countries are more likely to see damage from floods and rising sea levels. The damage from wildfires is expected to exceed that from floods.⁷⁴

In addition to reducing carbon emissions, each government needs to step up efforts to mitigate the risk of damage from extreme weather events. For example, countries should invest in flood defence systems and limit construction in areas prone to flooding. Preventive measures together with combative measures to contain global warming will help economies become resilient to future extreme weather events.

FUTURE OUTLOOK BY EUROPEAN COUNTRY

While each European country is expected to be affected by extreme weather events in the future, the impact on each country is likely to vary, as summarised in the table in Figure 8.

FIGURE 8: IMPACTS BY COUNTRY

COUNTRY	OUTLOOK FOR THE FUTURE
Austria	<p>The effects of climate change are manifold in Austria:⁷⁵</p> <ul style="list-style-type: none"> ▪ Average temperatures will continue to rise until the middle of this century. In the alpine region, potential consequences include increased intensity and frequency of precipitation and hail; more periods of drought; reduction of soil water content; and more floods, mudslides, glacier retreat and pest invasions. Additionally, the rise of the permafrost line leads to an increased danger of landslides in alpine regions. ▪ Hotter, drier summers are expected, with twice as many days above 30°C. ▪ Winters are likely to become less cold and snowy on average. Fewer days with snow cover is expected for several winter sports resort areas. <p>Although climate change impacts most industries, it is particularly damaging to the following Austrian sectors:</p> <ul style="list-style-type: none"> ▪ Agriculture is one of the industries most affected by climate change. Increased drought and climate variability reduces crop yield and quality, so normal crop yields will continue to drop. Additionally, crop-damaging insect pests will develop more rapidly, with heat-loving species spreading to the north. ▪ Similar problems are also evident in forestry. Rising temperatures are doing the most harm to the spruce, the most common tree species in Austria, which is also under heavy pressure from increased drought stress and pest infestation. In many places, the protective function of the mountain forest is being lost. Summer forest fires could become a threat in Austria, similar to what is already happening in the Mediterranean region. ▪ Tourism will also be impacted. Alpine glaciers have lost about 50% of their ice in the last 100 years due to temperature increases and changes in precipitation, and this trend is expected to continue. The visible retreat of the glaciers in the Alps means a loss of natural water reservoirs and fewer tourists who are drawn to the natural beauty of the area. Mild winters without sufficient natural snow could negatively impact winter tourism. <p>In addition to economic and environmental damages, climate change in Austria also presents a danger to human health from heat stress in summer (including warmer nights) and from the changed spread of pathogens or their vectors.</p>

⁷³ IPCC. Climate Change 2021: The Physical Science Basis. Retrieved 13 March 2022 from https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Full_Report_smaller.pdf.

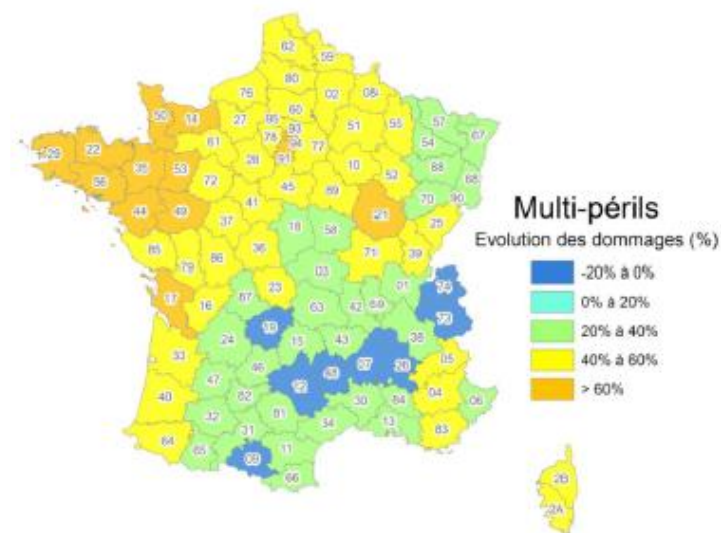
⁷⁴ New York Times (4 November 2021). A low-carbon economy is cheaper than the costs of climate change, a report says. Retrieved 13 March 2022 from <https://www.nytimes.com/2021/09/22/business/europe-climate-change-cost.html>.

⁷⁵ Oesterreich.gv.at. Climate Change and Its Consequences. Retrieved 13 March 2022 from https://www.oesterreich.gv.at/themen/bauen_wohnen_und_umwelt/klimaschutz/Seite.1000200.html.

COUNTRY	OUTLOOK FOR THE FUTURE
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Belgium	<p>The Belgian National Crisis Center concludes that the risk of floods occurring will rise as a result of climate change. The risk of flooding of water flows (e.g. rivers) is deemed likely to occur, with very high impact. Flood risk stemming from local rain is deemed highly to occur with low impact, while floods from sea water will have very high impact, but are deemed unlikely to happen.⁷⁶</p> <p>Furthermore, population growth and the associated increase in residential buildings, particularly in some risky areas, will lead to higher financial impact from future floods. Measures, such as repairing and strategically moving of dykes are undertaken to mitigate these impacts.⁷⁷</p> <p>In addition to increased flood risk, the Belgian Meteorological Institute also expects an increasing number of more intense heat waves, combined with longer periods of drought. Specifically for Brussels, calculations show that by 2100 the amount of heat waves can triple, with double intensity and 50% longer duration. The likelihood of extended periods of drought increases by a factor of five.⁷⁸</p>
France	<p>According to a 2018 study conducted by CCR, the cost of natural disasters would <i>increase by 50% by 2050</i> within the base case scenario, as explained by the sum of the following additive impacts:</p> <ul style="list-style-type: none"> ▪ In the metropole, the total annual mean cost of events (all things being equal) is expected to grow by 35% over 30 years. Looking at stand-alone impact by peril, the average annual loss will increase by 28% for droughts, 38% for floods, most likely linked to an increase in the frequency of heavy rains, and 82% for coastal submersions. ▪ An additional 15% increase in damages is expected due to risk concentration in high-risk areas located close to coasts and rivers, based on actual demographic trends. <p>The geographical repartition of these results highlights strong territorial disparities. The Atlantic seaboard, under the effect of demographic evolution and the rise in sea level, would see the damage increase by more than 60% in certain places. The vulnerability in Île-de-France would result in an increase of more than 40%. The increase would be around 30% for departments around the Mediterranean area. These results allow us to highlight territories that should be the subject of specific prevention policies, as illustrated below.⁷⁹</p>

EVOLUTION OF CLIMATE CHANGE BY LOSSES BETWEEN 2018 AND 2050 – GEOGRAPHICAL DISTRIBUTION



Source: CCR / Meteo France, retrieved from <https://www.ccr.fr/documents/35794/35836/Etude+Climatique+2018+version+complete.pdf/>

⁷⁶ Crisiscentrum.be. Overstroming. Retrieved 23 March 2022 from <https://crisiscentrum.be/nl/risicos-belgie/natuurlijke-risicos/overstroming>.

⁷⁷ Nieuwsblad.be. Ingrepen gepland om wateroverlast in de toekomst te verminderen. Retrieved 23 March 2022 from https://www.nieuwsblad.be/cnt/dmf20210716_95257229.

⁷⁸ Vrt.be. Welk klimaat heeft België in 2100? 5 graden warmer, veel natere winters en intensere hittegolven, waarschuwt KMI. Retrieved 23 March 2022 from <https://www.vrt.be/vrtnews/nl/2020/10/14/klimaatrapport-kmi/>.

⁷⁹ CCR (September 2018). "CONSÉQUENCES DU CHANGEMENT CLIMATIQUE SUR LE COÛT DES CATASTROPHES NATURELLES EN FRANCE À HORIZON 2050." Retrieved 13 March 2022 from <https://www.ccr.fr/documents/35794/35836/Etude+Climatique+2018+version+complete.pdf/6a7b6120-7050-ff2e-4aa9-89e80c1e30f2?t=1536662736000>.

COUNTRY	OUTLOOK FOR THE FUTURE
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Germany	<p>The German Weather Service and the 2021 Extreme Weather Congress published an extreme weather fact paper, which highlights the following:</p> <ul style="list-style-type: none"> ▪ Temperatures in Germany have risen by 1.6°C between 1881 and 2021, significantly more than the global average. The rate of warming has increased significantly over the past 50 years, with nine of the 10 warmest years since the 1880s occurring since 2000. ▪ With unchecked greenhouse gas emissions, an increase of up to 20 hot days a year in Germany is expected for the period between 2031 and 2060. This poses an increased risk of forest fires and depleted levels of water in rivers to the extent that inland waterway vessels can no longer sail. ▪ However, heavy rainfall events can also become more frequent due to climate change. Scientists analysed the areas around the rivers Ahr and Erft, which have been particularly affected by extreme rainfall. Due to global warming, the intensity of extreme precipitation increased in these regions between 3% and 19%. ▪ Additionally, the number of violent thunderstorms is also increasing. Data from insurance companies show that the sums paid for losses after severe thunderstorms have been growing continuously for decades.⁸⁰ <p>Cities need to be better prepared architecturally for extreme weather events. However, national and international governments are also obliged to make changes.</p>
Italy	<p>The Italian Institute for Environmental Protection and Research reports that:</p> <ul style="list-style-type: none"> ▪ Italy is one of Europe's most at-risk countries for landslides, with about 8% of the nation affected. ▪ About 4% of Italy is exposed to flood risk, with high-probability scenarios in the next two to 50 years. ▪ These risks are distributed throughout Italy, with about 91% of municipalities within high to very high landslide hazard zones and/or medium flood hazard zones. ▪ About 1.3 million people are exposed high to very high landslide risk. ▪ About 6.2 million people are exposed to high flood risk (return period of 20 to 50 years) and medium flood risk (return period of 100 to 200 years).⁸¹
Luxembourg	<p>In June 2021, the Luxembourgian government published its second flood risk management plan, which focusses on flood prevention, protection and preparedness, and invites citizens to comment.</p> <p>The plan's primary objectives are to increase awareness among citizens at risk of floods and to ensure that appropriate precautionary measures are taken.⁸² To that end, Luxembourg provides a national portal for government geodata and services, which includes flood risk per geographical zone. Earlier, the government had launched a website that provides a permanent flow of measured water levels and forecasts of watercourses in Luxembourg, as well as additional alerts and information during flood warning times.⁸³ The government concluded however that the alert system could be improved following the floods in July 2021.⁸⁴</p>
The Netherlands	<p>The likelihood and scale of future extreme weather events in the Netherlands depends largely on water management. The use of water locks can drastically mitigate the impact of rising water levels. Dikes must be properly maintained to prevent floods following breaches.</p> <p>Without additional measures, floods will likely increase due to rising sea levels and extreme rain events. The economic costs of floods will also increase because residences are being built in areas that are below sea level due to the housing shortage in the Netherlands. For example, a new community of 8,000 homes is planned for the polder area between Gouda and Rotterdam, even though the houses will be built six metres below sea level.</p>

⁸⁰ Extreme Weather Congress (24 September 2021). The coming disasters. Retrieved 13 March 2022 from <https://www.spiegel.de/wissenschaft/natur/extremwetter-wie-sich-deutschland-auf-zukuenftige-naturkatastrophen-vorbereiten-sollte-a-fcf8ac1a-8265-4bcf-b040-c4154d13d386>.

⁸¹ ISPRA. Landslides and floods in Italy: Hazard and risk indicators – 2018 Edition. Retrieved 13 March 2022 from <https://www.isprambiente.gov.it/en/publications/reports/landslides-and-floods-in-italy-hazard-and-risk-indicators-2013-2018-edition>.

⁸² The Luxembourg Government (24 June 2021). Strategies and measures to be better prepared for river and/or flash floods. Retrieved 13 March 2022 from https://eau.gouvernement.lu/fr/actualites.gouvernement%2Bfr%2Bactualites%2Btoutes_actualites%2Bcommuniques%2B2021%2B06-juin%2B24-strategie-inondations.html.

⁸³ Administration de la gestion de l'eau. FLOOD PREDICTION CENTER LUXEMBOURG. Retrieved 23 March 2022 from <https://www.inondations.lu/>.

⁸⁴ Luxembourg Time. Report into July flooding urges public alert system upgrade. Retrieved 23 March 2022 from <https://www.luxtimes.lu/en/luxembourg/report-into-july-flooding-urges-public-alert-system-upgrade-6160090bde135b9236a30494>.

COUNTRY	OUTLOOK FOR THE FUTURE
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To help local and regional governments get started with climate stress tests, the Ministry of Infrastructure and Water Management sponsors a digital Climate Impact Atlas. This website shows the effects of climate change throughout the Netherlands in current and future scenarios, including floods, drought and heat.

United Kingdom	<p>The economic loss and damage from flooding in the UK is projected to increase, from rivers, at the coasts and from intense downpours in urban areas.</p> <ul style="list-style-type: none"> ▪ There is a 10% chance of a catastrophic flood happening in England within the next two decades causing more than GBP 10 billion in damage. Such a flood would cause 10 times more flood damage than the combined impact of the tidal surge and storms of winter 2013-14, and three to four times more damage than in 2007.⁸⁵ ▪ The UK's biggest insurer, Aviva, estimates that one in five properties in the UK are at risk of surface-water, river or coastal flooding. According to Aviva, there has been a "major spike" in claims in the past two years. Even more worryingly, as seen in July 2021, there appears to be a rise in the number of flood events outside of winter months, due to increased surface water following heavy downpours.⁸⁶ ▪ While most business owners are worried about the impact of climate change over the next 10 years, 75% of small and medium-sized enterprises do not have business continuity plans that consider climate change risks and just 38% have flood insurance in place. Only 18% of all businesses have implemented any flood resilience measures to protect their premises. ⁸⁷ ▪ With a projected increase in the frequency of severe storms due to climate change, these problems in dense urban areas will only worsen in the future. Under a 1°C global warming scenario, daily rainfall rates are expected to increase by 6% to 7%, with sub-daily rainfall rates—those causing these short sharp severe downpours as experienced during the July 2021 events—likely to increase by 12% to 14%. This is expected to be compounded by population growth in cities and increased urbanisation.⁸⁸ <p>In July 2020, the Government and Environmental Agency announced a new GBP 5.2 billion flood prevention and coastal management strategy to be brought in over the next 10 years, including protection of 336,000 properties in England by 2027. The National Audit Office argues that investing in flood defences is highly cost-effective, concluding that each GBP 1 not invested means communities will suffer up to GBP 8 in unnecessary flood damage.⁸⁹</p> <p>Heat waves are also a rising and deadly threat.</p> <ul style="list-style-type: none"> ▪ These heat waves pose an increased risk of subsidence and many homes are unprepared. ▪ Wildfires can also endanger cities near moorlands such as Manchester and Sheffield.⁹⁰ ▪ An adverse impact on the agriculture industry is likely. <p>The UK has the capacity and resources to adapt, but more effort is needed from the government and individuals.</p>
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⁸⁵ Energy and Climate Intelligence Unit, Flood risk and the UK, op cit.

⁸⁶ The Guardian (5 September 2021). Flood warning: How to protect your home as insurance hikes seep in. Retrieved 13 March 2022 from <https://www.theguardian.com/money/2021/sep/05/flood-warning-how-to-protect-your-home-as-insurance-hikes-seep-in>.

⁸⁷ Aviva (23 September 2021). One in three business properties at risk from flooding, many unprotected from climate risks. Retrieved 13 March 2022 from <https://www.aviva.com/newsroom/news-releases/2021/09/one-in-three-business-properties-at-risk-from-flooding/>.

⁸⁸ JBA Risk Management, A Retrospective Look at London Surface Water Flash Floods, op cit.

⁸⁹ JBA Risk Management (May 2021). Modelling the Impact of Spending on Defence Maintenance on Flood Losses. Retrieved 13 March 2022 from <https://www.abi.org.uk/globalassets/files/publications/public/flooding/modelling-the-impact-of-spending-on-defence-maintenance.pdf>.

⁹⁰ The Guardian (4 March 2022). UK not prepared for climate impacts, warns IPCC expert. Retrieved 13 March 2022 from <https://www.theguardian.com/environment/2022/mar/04/uk-not-prepared-climate-impacts-ipcc-intergovernmental>.

Actionable steps for insurers

European insurers and reinsurers are uniquely positioned to leverage their expertise and data analytics capabilities to manage the financial risks associated with extreme weather events and climate change. It is business-critical for insurers to take a leading role in managing these risks. The following actionable steps for insurers have been notably identified.

ENSURE YOUR ORGANISATION IS ACTIVELY CONSIDERING CLIMATE RISK

Climate change has been a hot topic for years and there is increased pressure for insurers to actively consider climate-related risks, with an urgency that is accelerated by regulatory and legislative changes. For example:

- The March 2021 EU Sustainable Financial Disclosure Regulation requires insurers to provide a harmonised set of environmental, social and governance (ESG) disclosures. It is likely that European (re)insurers will come under pressure from competent authorities to integrate climate change risk into the Own Risk and Solvency Assessment (ORSA) process in 2021 and 2022.⁹¹
- In December 2021, the European Insurance and Occupational Pensions Authority (EIOPA) launched a consultation on the application guidance on running climate change materiality assessment and using climate change scenarios in ORSA. Milliman published a [briefing note](#) highlighting the most important proposed guidance and its implications for insurers.⁹²

Decision makers such as senior managers and members of the board of directors should ensure that their insurance firms are accurately assessing and mitigating climate-related risks, if they have not already done so. These efforts should span underwriting, pricing, reserving and investment.

IMPROVE THE ASSESSMENT OF FUTURE EXPECTED LOSSES

With extreme weather events becoming more frequent and more severe, catastrophe models that rely on historical data may become less useful for future loss projections. Insurers could use big data and predictive analytics to generate more accurate estimates of future losses. This would support actuarial teams in estimating the reserves needed for the affected classes of business.

Appropriate pricing, underwriting rules and special terms or limits can control exposure. Underwriting and pricing teams should ensure that the proposal form includes questions that would help price extreme weather events appropriately. For example, to capture the risk of flash flooding, questions should be asked to identify basements and analyse the data against modelled flood metrics. As market techniques evolve, insurers need to maintain state-of-the-art data analytics and other technologies such as artificial intelligence (AI) to avoid liability for less identifiable risks.⁹³

TAKE A STRATEGIC APPROACH TO MANAGING CLIMATE RISK

Climate change can impact both sides of an insurer's balance sheet by changing the underlying risk profile of certain insurance products and overvaluing the insurer's assets due to unassigned climate risk. To keep pace, insurers must integrate climate risk assessment into their governance frameworks, business strategies, risk management processes and scenario analyses. This could help identify any correlating impacts across different lines of business and investments, thereby aiding decision-making processes.

Insurers need to take a strategic approach to managing climate risks, considering both current and forward-looking risks. This approach should identify actions required to manage those risks in a manner proportionate to the nature, scale and complexity of insurers' businesses. Specifically, an insurer should:

- Integrate the consideration of climate risks into its governance structure at the group or insurer entity level.
- When making business decisions, consider the current and forward-looking impact of climate-related factors on its business using time horizons that are appropriately tailored to the insurer, its activities and the decisions being made.

⁹¹ Milliman (May 2021). EIOPA Opinion: Use of climate change risk scenarios in ORSA. Retrieved 13 March 2022 from https://ie.milliman.com/-/media/milliman/pdfs/2021-articles/5-17-21-eiopa-opinion-orsa_briefing-note.ashx.

⁹² Ruissaard, M. & de Boer, M. (December 2021). Application Guidance on Running Climate Change Materiality Assessment and Using Climate Change Scenarios in the ORSA. Milliman Briefing Note. Retrieved 13 March 2022 from <https://www.my-milliman.com/en-GB/insight/application-guidance-running-climate-change-materiality-assessment-using-climate-change-scenarios>.

⁹³ JBA Risk Management, A Retrospective Look at London Surface Water Flash Floods, op cit.

- Incorporate climate risks into the insurer's existing financial risk management, including embedding climate risks in its risk management framework and analysing the impact of climate risks on existing risk factors.
- Use scenario analysis to inform business strategies and risk assessment and identification.
- Disclose its climate risks when developing its disclosure approaches.⁹⁴

ENGAGE WITH POLICYHOLDERS AND POLICY MAKERS

By working with policy makers, insurers can play a key role in educating policyholders about climate-related risks. This would ensure that policyholders consider whether they have adequate protection for their needs. Education might also result in higher insurance penetration in communities and regions that need it the most.

Insurers could also look to incentivise policyholders who are proactively reducing their climate-related exposure, for example through discounted premiums or financial assistance. Some insurers might consider increasing premiums to factor in climate risk, but an increase might result in unaffordable premiums and lower take-up rates. Instead, insurers should proactively work with policy makers to adopt policies that enable a climate-resilient future. For example, in the UK, changes to Flood Re, the insurance scheme for homes at high risk of flooding, will allow insurers to help flooded households make their homes more resilient. By installing air brick covers, flood doors and flood-resistant plasterboard, homeowners will benefit from lower premiums.⁹⁵

USE RISK AS AN OPPORTUNITY

Emerging risks can present new opportunities. Some large insurers are already taking advantage of climate risks and developing new climate-supportive products and services.

Parametric insurance is commonly used in agriculture as a preventive approach to natural disasters. It is more widely used to complement traditional insurance and as a tool to increase climate resilience.

STAY CURRENT WITH THE MILLIMAN CLIMATE RESILIENCE INITIATIVE

Building on a foundation of expertise modelling complex risks, the Milliman Climate Resilience Initiative (MCRi) unites perspectives across industry, government, academic and not-for-profit sectors to anticipate and measure the most pressing climate risks and drive effective responses. [Sign up to receive notifications](#) about upcoming MCRi webinars and events, access the latest research and explore products and services designed for climate resilience.⁹⁶

⁹⁴ New York State Department of Financial Services (15 November 2021). Final Guidance to New York Domestic Insurers on Managing the Financial Risks from Climate Change. Retrieved 13 March 2022 from https://www.dfs.ny.gov/reports_and_publications/press_releases/pr20211115.

⁹⁵ The Guardian (29 July 2021). Record funding for flood defences in England as climate crisis worsens risks. Retrieved 13 March 2022 from <https://www.theguardian.com/environment/2021/jul/29/record-funding-for-flood-defences-in-england-as-climate-crisis-worsens-risks>.

⁹⁶ Milliman. Milliman Climate Resilience Initiative. Retrieved 13 March 2022 from <https://us.milliman.com/en/insurance/milliman-climate-resilience-initiative>.



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