Dry-roasted NUTS: early estimates of the regional impact of 2025 extreme weather*

Sehrish Usman† Miles Parker‡ Mathilde Vallat§

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Abstract

We estimate the economic impact of three types of extreme weather events – floods, droughts and heatwaves – that occurred in Europe during the summer of 2025. Using weather data and estimates of average historical impact from Usman et al. (2025), we conservatively calculate that these events will lower gross value added (GVA) in the affected NUTS3 regions by a combined €43 billion in 2025, equivalent to 0.26 percent of total European Union output. Beyond these short-term losses, the regional impact of extreme events historically increases over time, with substantial impact in the following years. Based on the average historical experience, we estimate that the annual GVA in the affected regions will be €126 billion lower by 2029 than had these events not occurred.

1 Introduction

Europe has been plagued by extreme weather events in recent years. 2021, 2022 and 2023 were three of the top four years on record for damage caused by climate-related events in Europe (European Environmental Agency, 2024). Continued global warming is expected to cause more frequent and more intense extreme events in the coming decades (Intergovernmental Panel on Climate Change, 2021).

The full human and economic costs of such events only manifest over time, given the many channels of impact. As a result, estimates of the impact of extreme weather can be subject to delay, which can hamper effective policy response. At the time of writing, the European Environment Agency only publishes data up until 2023.

*The views expressed here are those of the authors and do not necessarily represent those of the European Central Bank nor its Governing Council.

†University of Mannheim: Sehrish.Usman@uni-mannheim.de

‡European Central Bank: Miles.Parker@ecb.europa.eu

§European Central Bank: Mathilde.Vallat@ecb.europa.eu

To bridge that gap, we propose a method to estimate the potential impact of extreme weather events in quasi real time. We combine up-to-date weather data from the ERA5 reanalysis dataset created by the European Centre for Medium-Range Weather Forecasting with newly published estimates of the historical impact of extreme weather on EU regions calculated by Usman et al. (2025). Using this approach, we derive estimates for the current and future impact on gross value added (GVA) of extreme events that took place in meteorological Summer (June, July and August) 2025.

As discussed in Section 2 below, the literature uses a wide range of measures to estimate the costs of extreme weather. GVA losses provide a better metric of the full impact of these events than estimates of just the direct physical damage to assets. Over time, the initial impact can propagate to other sectors and regions through supply chains and other channels. For example, there is clear evidence that extreme weather events affect food prices globally.

Moreover, while reasonable estimates of physical damage can be estimated for some events, such as storms and floods, the full economic impact extends beyond physical damage. Summer heatwaves, for example, cause little by way of physical destruction but can substantially reduce hours worked and output in the construction and hospitality sectors. Only by establishing the counterfactual of what economic activity would have been in the absence of the event can the true economic cost be calculated.

Our approach focuses on the impact of extreme weather on economic activity in EU NUTS3 regions. These are the smallest regions available under the European Union's nomenclature of territorial units for statistics (NUTS).[1] Using ERA5 data, we identify 279 NUTS3 regions – a quarter of the EU total – affected by weather extremes. This includes 53 with extremely wet conditions, which for simplicity we label floods, 31 with heatwaves, 130 with droughts and a further 65 compound events where both a heatwaves and a drought occurred simultaneously (Figure 1).

Using the average historical impact of such events on regional activity estimated by Usman et al. (2025), we calculate that activity in these regions is likely lower by €43 billion in 2025. This is equivalent to 0.26 percent of aggregate EU GVA, although it is not possible to translate that figure to the ultimate impact on the published EU aggregate, given unknown sign and size of spillovers to regions initially unaffected by extreme events. Usman et al. (2025) find that the negative impact of extreme weather events on European regions worsens, with the greatest impact often several years after the event, even for regions where no further extreme event occurs. Based on these historical relationships, economic activity is likely to be depressed in the coming years in the regions affected by extreme events this summer, with the estimated loss of GVA in 2029 reaching €126 billion in 2024 terms.

These estimates are likely conservative for two principal reasons. First, we do not consider compounding impacts of heatwaves and droughts, given lack estimated historical estimates for simultaneous occurrence. For regions where both of these extremes occur simultaneously, we have assumed the impact to be equivalent to that if the region were just affected by drought. Second, we do not calculate here the impact of wildfires, which

[1]Our final sample is restricted to 1102 NUTS3 regions as we have the regional level macroeconomic data only for these regions.

have been substantial during July and August. Around 1 million hectares have been burnt across the European Union in 2025, including almost 3 percent of Portugal's land area (Joint Research Council, 2025). The area affected is the largest on record and will add substantial economic losses to those presented here.

Considerable uncertainty surrounds these estimates. We provide confidence intervals for our central estimates. A range of country-specific institutions can influence the economic impact of extreme events, resulting in divergence of country outcomes from the average. For example, Giuzio et al. (2025) find that high rates of insurance coverage play a protective role in reducing the economic consequences of extreme events. Insurance coverage differs substantially between European countries (ECB-EIOPA, 2023). As a result, the country-level results should be viewed as more uncertain than those for the aggregate European Union. To the extent that households and businesses put in place adaptation following the extreme events of recent years, that may mitigate the impact of the events in summer 2025. Although, as discussed below, adaptation is not costless and can itself weigh on growth.

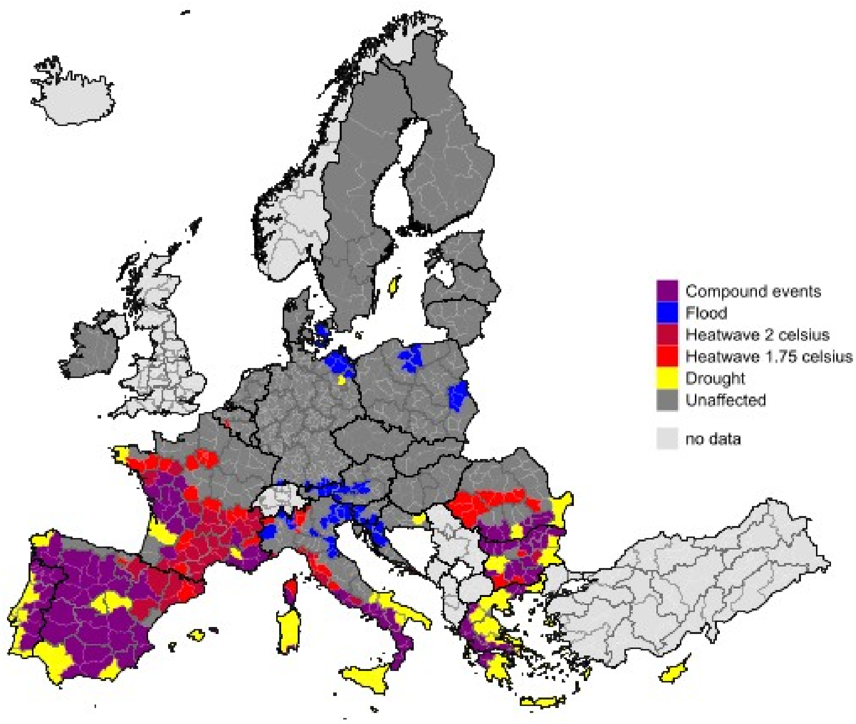

Figure 1: Extreme events across NUTS3 regions in summer 2025

Notes: Figure 1 shows extreme weather events identified as occurring during Summer 2025 at NUTS3 level across EU Member States. These weather events include heatwaves, floods, droughts and compound events of a simultaneous heatwave and drought. The definition of extreme events is based on Usman et al. (2025)

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2 A catalogue of catastrophe costs

Catastrophes affect society and the economy through a range of channels, some of which only manifest over time. There are a wide range of metrics used by economic studies to measure these impacts, which can cause confusion and hampers comparability between studies. This section briefly discusses the main definitions used in the literature. While it is important to avoid double counting across categories, this wide range of definitions demonstrates that the costs of catastrophes far exceed simple measures of damage and destruction.

- **Direct costs:** Following Hallegatte and Przyluski (2010), the impacts of catastrophes can be split between direct and indirect impacts. Direct impacts are those that occur immediately at the time of the extreme event from exposure to the event itself. Examples include destruction of roads, bridges and buildings from floods, destruction of crops and livestock and deaths. The European Environmental Agency (EEA) estimates that climate-related extremes caused loss of assets equivalent to €738 billion in 2023 terms between 1980 and 2023, a fifth of which occurred in 2021-2023 (European Environmental Agency, 2024). The EEA describes these costs as "economic losses", a term derived from the insurance industry to distinguish from insured losses. Yet this terminology is misleading, since it does not incorporate all direct economic costs, let alone indirect costs of catastrophes. For example, heatwaves often cause little by way of asset losses, crops aside. Some of the main economic channels of direct impact, such as reduced productivity and output in construction and hospitality, are not captured by this measure. It also does not capture economic losses from indirect impacts, as discussed next.

- **Indirect costs:** Indirect costs cover a broad range of impacts that extend beyond the initial impact. For example, the loss from a factory destroyed by a flood includes not just the value of the assets, but the flow of production that no longer occurs until the factory is rebuilt (assuming that it is, in fact, actually rebuilt). Lower output from destruction and disruption, alongside the diversion of resources towards reconstruction means that other – initially unaffected – sectors can also suffer from reduced demand and activity. The extent of these indirect impacts depends on a the magnitude of the extreme event as well as a range of institutional factors that determine the amplification of economic impact (Hallegatte et al., 2007). As a result, the literature typically estimates the impact of extreme events on GDP (e.g. Noy, 2009; Fomby et al., 2013; Felbermayr and Gröschl, 2014; Klomp and Valckx, 2014). Although exact methods differ between authors, the general aim of this approach is to estimate the direct and indirect impacts of extreme events relative to a fictional counterfactual of the extreme event not occurring. Even this approach does not fully capture the costs of catastrophes. For example, reconstruction activity boosts GDP, but does not represent an unambiguous net welfare gain, since it is replacing what was lost, rather than increasing total assets.

- **Human costs:** The societal impact of catastrophes extends beyond pure economic losses. Nearly a quarter of a million EU citizens lost their lives to extreme weather events over the period 1980-2023 (European Environmental Agency, 2024). 2025 has been no exception: Clarke et al. (2025) estimate that the heatwave across Europe in late June / early July caused over 2300 excess deaths in 12 major European cities. There is evidence that extreme events can reduce education levels, particularly if lower incomes following the event force families to withdraw children from education. Caruso and Miller (2015) find this effect persists through generations as lower levels of educational attainment result in lower lifetime incomes for females and lower educational attainment for their children.

- **Fiscal costs:** Catastrophes affect fiscal balances through three principal channels: by reducing tax revenue as overall activity falls, increasing benefit payments as unemployment increases, and increasing other spending as funds are directed to support affected regions (Lis and Nickel, 2009; Noy and Nualsri, 2011). Historically, governments in advanced economies have typically acted in a countercyclical fashion and increased deficits in response to a major catastrophe. By contrast, governments in developing economies have acted in procyclical fashion by increasing taxes or reducing spending, likely to stave off investor concerns over debt sustainability. There is a risk, as debt levels rise in advanced economies and climate change results in more frequent and more intense extreme events, there is growing risk that fiscal authorities in advanced economies will face more difficult decisions over their response to such events.

- **Inflation:** There is a growing body of evidence that floods, droughts and (summer) heatwaves increase food prices (e.g. Parker, 2018; Faccia et al., 2021; Ciccarelli et al., 2024; Kotz et al., 2024, 2025). These price increases affect in particular consumers in relatively low-income regions, as well as low-income households in relatively richer regions since food has a higher share in total spending for these households. Faced with higher food costs, low-income households face the unenviable choice between reducing food consumption (threatening food security), obtaining calories from less nutritious sources (threatening long-term health), or reducing expenditure on other essentials (Kotz et al., 2025).

- **Adaptation costs:** It is possible to reduce the impact of extreme events by investing in adaptation capital, such as flood protection, air conditioning, irrigation, etc. Yet adaptation is not costless: while it helps reduce the likelihood that extreme weather events become disasters, it is not necessarily as effective at reducing damage once an event occurs (Ficarra and Mari, 2025), and also diverts resources away from other, productivity-enhancing uses. Usman et al. (2025) find that investment and capital increase in the years following a heatwave, but that total factor productivity falls sharply, showing that such capital is on average less productive. Dietz and Lanz (2025) take a longer-term perspective and show that countries have on average been successful in protecting agriculture from the effects of climate change, but this has come at a cost of reduced investment in other sectors, reducing long-run income growth.

- **Spillovers:** The majority of the literature focuses on the impact of extreme weather in the country or region where it occurs. However, trade and supply-chain linkages likely lead to impacts beyond the immediate vicinity. Bijnens et al. (2024) investigate the impact of the July 2021 Belgian floods. Firms directly impacted by the floods had an average 15% reduction in sales. But their customers were also affected. Sales by firms in other regions initially unaffected by the floods were reduced by 0.3% for each 1% of inputs from an affected supplier. Kotz et al. (2025) find that drought and heatwaves in Ghana and Côte d'Ivoire in early 2024 raised global cocoa commodity prices by 280%. Drought in Spain and Italy during 2022 and 2023 increased EU-wide olive oil prices by 50% in January 2024. More generally, Peersman (2022) finds that global harvest shocks can explain almost 30% of euro area food price volatility.

- **Benefits?** Theoretically, it may be possible for extreme weather to provide economic benefits. Plentiful rainfall can help support crop growth. Fomby et al. (2013) find that agricultural output is higher the year following moderate floods, although this effect disappears for severe floods, which can remove topsoil. It is also possible that the destruction of capital provides the opportunity to invest in new capital – to 'build back better.' The literature finds few examples of such cases, with middle-income countries integrated into world trade being the standout example (Cuaresma et al., 2008). Partly, the long-run negative impact on affected regions derives from outward migration, reducing the available labour force. While this is a cost to the affected region, it is not necessarily so in net terms. Relocating workers boosts the workforce of other regions, and the displaced may themselves eventually achieve better outcomes (Deryugina et al., 2018). Nonetheless, substantial climate-driven migration from heavily affected countries may increase social tensions.

In the analysis in this paper we focus on the impacts of extreme events on regional gross value added (broadly equivalent to GDP). As such, it captures in large part the direct and indirect impacts on the affected regions. However, the method used here is unable to determine the degree of spillover (positive or negative) to other regions within the same country and elsewhere. As such, it is not possible to translate the numbers into predictions for impacts on national GDP.

3 Data

Our study uses weather data from the ERA5 reanalysis, produced by the European Centre for Medium-Range Weather Forecasts (ECMWF) and accessible via the Copernicus Climate Data Store. ERA5 combines model data with observations from across the world to produce a harmonised record of past weather and climate. We focus in this paper on the 2025 meteorological summer in Europe, covering the period June to August. The raw data are available at an hourly frequency on a global grid with a spatial resolution of approximately 31 km $\times$ 31 km. From this dataset, we extract data for Europe on two variables: air temperature at two metres and total precipitation.

Hourly observations are aggregated to daily and subsequently to monthly values, resulting in grid-level measures of average temperature and cumulative precipitation. These grid values are then translated into regional indicators at the NUTS3 level. To do so, we apply a population-weighted mask, which ensures that the regional aggregates reflect the climatic conditions experienced by residents rather than a simple spatial average. This produces a balanced monthly panel of temperature and precipitation for all NUTS3 regions in the European Union, forming the empirical basis for the subsequent analysis.

In addition to monthly means, we construct an indicator of three-day maximum precipitation, defined as the largest cumulative rainfall over any three consecutive days within the month. This measure captures the intensity of short-duration extreme rainfall events, which are particularly relevant for flooding and associated disruptions to economic activity, but may be masked when considering only monthly averages.

We use regional-level economic data at the NUTS3 level on the GVA from European Commission ARDECO databases. The variable GVA is available at annual frequencies and we take the values of year 2024 as the baseline for all regions.

4 Method

We identify the occurrence of heatwaves, droughts and floods across European NUTS3 level regions using the definitions from Usman et al. (2025). For summer heatwaves, we first estimate the temperature anomaly as the deviation of observed temperatures during summer 2025 from the historical 1991-2020 mean summer temperature for each region, measured in degrees Celsius. We then define a summer heatwave as a positive temperature anomaly that surpasses a critical threshold. Specifically, our heatwave event variable is a binary variable that takes the value 1 if a summer temperature anomaly in 2025 exceeds the threshold of 2 °C, and 0 otherwise. Below this threshold, temperatures are assumed to be sufficiently close to historical averages that there is negligible economic impact. The advantage of using anomalies is that they provide an estimate of the temperature surprise faced by the region and controls for baseline differences between regions.

We define a drought as an indicator variable for each region that takes the value 1 when the standardised precipitation index (SPI) during summer 2025 shows severe to extremely dry conditions. We compute the SPI using total precipitation over an accumulation period of three months during June-August. The index measures precipitation anomalies at a given location based on observed total precipitation during an accumulation period of three months, and these historical data are fitted to a probability (gamma) distribution. The fitted probability distribution is normalised to calculate the index such that the average SPI value for a region and period is zero. The value of SPI between -1 to +1 shows normal precipitation conditions, whereas values below -1.5 show severe dryness and below -2 imply extreme dryness.

We predict flood events by calculating the standardised precipitation index (SPI) using the maximum three-day precipitation accumulation during each month, where values above +1 show excess rainfall and above +2 imply extreme rainfall. We define floods here as events when the SPI takes a value above 2 inclusive. These predicted flood events are particularly severe flash floods, in contrast to those that occur after prolonged high rates of precipitation.

After identifying the occurrence of the three types of extreme events in European regions, we further proceed by estimating the expected GVA loss in the identified NUTS3 regions, using coefficients from Usman et al. (2025). Given those coefficients are for unique events only, we do not have estimates for compound events where droughts and heatwaves occur simultaneously. We elect, therefore, to treat regions with compound events as if they were affected by just a drought.

The economic impact of summer heatwaves varies depending on the baseline climate conditions of regions. Heatwaves are more likely to exceed critical absolute temperature thresholds in hotter regions than cooler ones. In line with Usman et al. (2025), we divide the historical data into terciles based on average quarterly temperature during summers for 1991-2020, coinciding with the baseline average for calculating anomalies. The regions in the first tercile have the lowest average temperatures and are labelled cold regions. Those in the third tercile have the highest temperatures and are termed hot regions. In what follows, we label regions in the middle tercile as temperate. We estimate the impact of heatwaves separately for each of these three groups of regions.

Annual monetary losses: For a region i with baseline gross value added (GVA) $GVA_{i,2024}$, the monetary loss at each horizon h is:

$$\text{Loss}_{i,h} = GVA_{i,2024} \cdot \left(e^{\beta_h/100} - 1\right).$$

Confidence intervals: We compute 90% confidence intervals by estimating β_h with $z = 1.645$ standard errors:

$$\beta_h^{lo} = \beta_h - z \cdot SE_h \qquad \beta_h^{hi} = \beta_h + z \cdot SE_h$$

The corresponding lower and upper bounds are as follows:

$$\text{Loss}_{i,h}^{lo} = GVA_{i,2024} \cdot \left(e^{\beta_h^{lo}/100} - 1\right), \qquad \text{Loss}_{i,h}^{hi} = GVA_{i,2024} \cdot \left(e^{\beta_h^{hi}/100} - 1\right)$$

Aggregation Finally, we aggregate the losses by summing across NUTS3, country, euro area and European Union level. We report the losses as the share of GVA of respective unit using the formula below. Although this should not be taken as the loss for that level of aggregation, given unknown spillovers to initially unaffected regions.

$$\text{Percentage loss as share of GVA}_h = \frac{\text{Loss}_h}{\text{GVA}_{2024}} \times 100$$

5 Results

In this section, we present our estimates for regional GVA losses for each extreme event type in turn followed by our estimates of combined losses over the three types of events.

5.1 Heatwaves

We observe 96 regions that were hit by summer heatwaves in 2025. Most of these regions (74) fall into the category of hot regions, while 17 are temperate regions and 5 colder regions. Our results show that regions from France, Spain, Italy, and Bulgaria are the hardest hit. As noted above in Section 4, we treat regions affected by both heatwaves and droughts as if they were affected by droughts alone. The estimated impact of heatwaves presented in this section therefore relate solely to the 31 regions that were affected by heatwaves and not droughts.

The aggregate GVA losses for French regions are expected to be €4.8 billion in 2025 (equivalent to 0.18 % of 2024 French GVA) and €20.3 billion by 2029 around 0.78% of 2024 French GVA. The Spanish regions have the next highest losses, with a total annual loss of €1.5 billion in 2025 (0.10 % of baseline GVA)€7.2 billion by 2029 (0.5% of baseline GVA). Our estimates show that the aggregate estimated regional losses for European Union countries are €6.8 billion in 2025 and €30 billion by 2029 which is equivalent to around 0.04% of EU 2024 GVA in 2025, worsening to around 0.19% by 2029.

We next consider some regions in detail as an illustration, this focus is expository rather than exhaustive and does not imply greater importance relative to other areas. In France, the NUTS2 region of Languedoc-Roussillon (comprising the NUTS3 regions départements Aude, Gard, Hérault, Lozère, and Pyrénées-Orientales) was among the hardest hit by heatwaves. Many of these regions faced an early heatwave that contributed to a new record of monthly average temperature in June, followed by a prolonged heatwave episode in August. For instance, in Aude the highest observed temperatures were 37 °C in June-July, and 39 °C in August. Over summer, daily maxima exceeded 35 °C for 15 days in Aude and 24 days in Gard. Gard recorded a peak of 39.4 °C while parts of regions in Midi-Pyrénées (another NUTS2 level region) such as Tarn-et-Garonne experienced temperatures above 41.5 °C. We estimate these events would cost an average aggregate economic loss of €1.24 billion in 2025, and €7.36 billion by 2029 (8.34%). In terms of GVA/capita, we estimate that this is equivalent to €415 and €2,467 in 2025 and 2029, respectively (see details in A1). This excludes the damages from the wildfire in early August that burnt 17,000 ha in early August, reportedly the largest in France in nearly 80 years (Copernicus, 2025). Drought conditions and dried vegetation are considered the driving factors in exacerbating the fire spread.

Table 1: Heatwave losses in affected regions

Country	GVA loss (mn €)		Loss as share of 2024 GVA (avg and 90% CI)	
	2025	2029	2025	2029
Bulgaria	-16.10	-95.52	−0.02 [−0.04, 0.01]	−0.11 [−0.16, −0.05]
Spain	-1,479.67	-7,220.54	−0.10 [−0.23, 0.03]	−0.50 [−0.77, −0.22]
France	-4,793.67	-20,273.15	−0.18 [−0.41, 0.05]	−0.78 [−1.26, −0.27]
Italy	-494.09	-2,572.72	−0.03 [−0.06, 0.01]	−0.13 [−0.20, −0.06]
Euro area	-6,767.43	-30,066.42	−0.05 [−0.11, 0.01]	−0.22 [−0.35, −0.08]
European Union	-6,783.53	-30,161.93	−0.04 [−0.10, 0.01]	−0.19 [−0.30, −0.07]

Notes: The table reports estimates of the economic impacts of heatwaves on gross value added (GVA) of European Union countries. Columns 2 and 3 present annual losses in million euros relative to the 2024 baseline. Columns 4 and 5 show the corresponding losses as a share of 2024 GVA. Entries are reported as the point estimate followed by the 90% confidence interval in brackets. These aggregates are based on identified events of summer 2025 heatwaves at NUTS3 regional level. All estimates are calculated from the empirical estimates derived by Usman et al. (2025).

5.2 Droughts

We identify 195 regions across the European Union with droughts in Summer 2025. These regions are clustered in Southern European countries, with regions in Spain, Greece, Italy, Portugal and Bulgaria particularly affected by severely and extremely dry conditions. Spanish regions are expected to experience a combined loss of €10.7 billion in 2025, rising to €27.6 billion in 2029. This is equivalent to -0.7% and -1.90% of 2024 national GVA respectively. Greek regions are also exposed to strong impacts, with expected aggregate GVA losses in affected regions exceeding 1% of national GVA in 2025, worsening to –2.9% by 2029. Combined losses in affected regions in Portugal and Romania are also expected to exceed 1% of national 2024 GVA in 2029.

The aggregate estimated regional losses for euro area countries are €26.8 billion in 2025 and €69 billion in 2029 which is equivalent to around 0.2% of euro area GVA in 2025, worsening to around 0.51% by 2029. At the European Union level, the total regional losses from droughts are expected to cost €29.4 billion in 2025 (equivalent to 0.18% of EU GVA) and €75.6 billion in 2029 (equivalent to 0.47% of EU GVA).

To illustrate broader dynamics, we consider selected regions as a case study. In Spain, the NUTS2 region of Andalucia was among the hardest hit, with all provinces (Almería, Cádiz, Córdoba, Granada, Huelva, Jaén, Málaga, and Sevilla) affected by severe to extreme dryness, creating a substantial drought risk. Most of the regions in Andalucia experienced dry conditions starting in April 2025, intensifying in July and August to extremely dry levels. These persistently dry conditions over a prolonged period substantially increased drought risk. We define drought hazard based on the Standardized Precipitation Index (SPI), where values below -1.5 indicate severe to extreme dryness. The SPI values for these regions reached as low as -7, reflecting exceptionally dry conditions for a prolonged period. This region is known for its agriculture and tourism in Spain and frequent, repeated and prolonged spells of droughts can significantly affect economic activity in the region especially the highly populous provinces such as Huelva, Cadiz, and Malaga. The Regional Government of Andalusia is allocating €517.8 million to promote measures addressing drought hazards (Zarza, 2024). By contrast, our estimates indicate that the region's GVA losses will amount to €2.2 billion in 2025 and €5.7 billion by 2029, equivalent to 1.1% and 2.9% of the region's 2024 GVA, respectively. The GVA per capita loss is expected to be around €252 and €649 in 2025 and 2029, respectively. These projected losses substantially exceed the investments currently directed at mitigating water resource scarcity.

We observe similar patterns in other regions of Spain like Castilla y León (NUTS2 region) where all nine provinces including Ávila, Burgos, León, Palencia, Salamanca, Segovia, Soria, Valladolid, Zamora have been affected by droughts, exacerbating massive wildfires. The region's GVA losses are estimated at €782 million in 2025 and €2 bn by 2029, equivalent to 1.1% and 2.9% of the region's GVA in 2024, respectively. This is equivalent to GVA per capita income loss of €323 and €831 in 2025 and 2029, respectively (see details in A3).

Table 2: Drought losses in affected regions

	Annual loss (mn €)		Loss as share of 2024 GVA (avg and 90% CI)	
Country	2025	2029	2025	2029
Bulgaria	-958.59	-2467.85	−1.06 [−1.84, −0.28]	−2.73 [−4.53, −0.59]
Greece	-2321.30	-5976.10	−1.13 [−1.95, −0.30]	−2.90 [−4.81, −0.63]
Spain	-10720.47	-27599.43	−0.74 [−1.28, −0.19]	−1.90 [−3.16, −0.41]
France	-5314.89	-13682.98	−0.20 [−0.35, −0.05]	−0.52 [−0.87, −0.11]
Croatia	-41.95	-107.99	−0.06 [−0.10, −0.02]	−0.15 [−0.25, −0.03]
Italy	-6794.40	-17491.92	−0.35 [−0.60, −0.09]	−0.89 [−1.48, −0.19]
Portugal	-969.02	-2494.71	−0.39 [−0.68, −0.10]	−1.01 [−1.67, −0.22]
Romania	-1538.46	-3960.71	−0.48 [−0.83, −0.13]	−1.23 [−2.05, −0.27]
Euro area	-26819.29	-69045.20	−0.20 [−0.34, −0.05]	−0.51 [−0.84, −0.11]
European Union	-29357.71	-75580.27	−0.18 [−0.32, −0.05]	−0.47 [−0.78, −0.10]

Notes: The table reports estimates of the economic impacts of droughts on gross value added (GVA) of European Union countries. Individual country entries exclude those countries with 2029 impacts smaller than 0.1% and countries comprised of a single NUTS3 region. The results for these affected regions are still included in the overall euro area and European Union figures. Columns 2 and 3 present annual losses in million euros relative to the 2024 baseline. Columns 4 and 5 show the corresponding losses as a share of 2024 GVA. Entries are reported as the point estimate followed by the 90% confidence interval in brackets. These aggregates are based on identified events of summer 2025 droughts at NUTS3 regional level. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

5.3 Floods

For floods, we identify 53 regions across the European Union that witnessed extreme wet conditions in Summer 2025. The estimated total losses from floods in Italian regions are around €4.6 billion and €14.2 billion in 2025 and 2029 respectively. This is equivalent to 0.23% of national GVA in 2025 and 0.72% in 2029. Slovenian regions were exposed to a similar degree of loss, in comparison to national GVA.

At the euro area level, the total monetary losses are expected to be around €6.8 billion in 2025 and €30.1 billion in 2029. In relative terms, it is around 0.05% of euro area GVA in 2025 and 0.22% by 2029. At the European Union level, the losses from floods in summer 2025 are expected to be around €6.5 billion in 2025 (0.04% of GVA) and €30.2 billion by 2029 (0.19% of GVA).

To illustrate broader dynamics, we consider selected regions as a case study. In Italy, the norther region of Lombardy (NUTS2 region) was particularly hard hit, with four provinces affected (Milano, Varese, Como, and Mantova). In early July 2025, Lombardy was battered by violent storms that caused flash floods, uprooted trees, airport disruptions, and damage to schools and public spaces/parks in areas like Bergamo, Como, and Milan. Later, in late August, renewed extreme weather — with rainfall exceeding 100–200 mm, swollen rivers, landslides, and red alerts—brought widespread flooding, evacuations, and infrastructure risks (Rai News, 2025). A close look at the data for these provinces suggests that they have experienced intense rainfall leading to extremely wet conditions, after a prolonged heatwave. Such extreme precipitation over short periods increases the risk of flash floods, which can generate substantial short- and medium-term disruptions to economic activity in the region. In particular, the concentration of population and infrastructure in urban areas such as Milano heightens exposure to hydrological hazards, while agricultural systems in the surrounding provinces are also vulnerable. These findings are consistent with broader evidence that climate change is amplifying the frequency of extreme precipitation events in Northern Italy. Based on our estimates, the region's GVA losses are projected at €2.5 billion in 2025 and €7.65 billion by 2029, equivalent to 0.55% and 1.70% of the region's 2024 GVA, respectively .

In Germany, the NUTS1-level region of Mecklenburg-Vorpommern was hit by floods, with five provinces affected including Rostock Kreisfreie Stadt, Landkreis Rostock, Mecklenburgische Seenplatte, Vorpommern-Rügen and Vorpommern-Greifswald). The Lander's GVA losses are estimated at €362 million in 2025 and €1.12 billion by 2029, equivalent to 0.64% and 2% of the region's GVA, respectively. In terms of GVA/capita, we estimate that this is equivalent to €228 and €708 in 2025 and 2029, respectively (see details in A5). Severe weather and heavy rain caused flooding in the greater Rostock region, with rainfall levels in just one hour exceeding the amounts usually measured in two weeks. The Mecklenburgische Seenplatte county also faced flooding, including numerous basements in private homes, a hospital and a hotel. The village of Schmarsow in the Vorpommern-Greifswald county reported the heaviest rainfall at 91 litres per square metre within one hour – an amount one and a half times greater than rainfall levels previously measured in July (Norddeutscher Rundfunk, 2025).

Table 3: Flood losses in affected regions

Country	GVA loss (mn €)		Loss as share of 2024 GVA (avg and 90% CI)	
	2025	2029	2025	2029
Austria	-443.07	-1,373.94	−0.10 [−0.16, −0.05]	−0.32 [−0.49, −0.14]
Denmark	-224.83	-697.21	−0.06 [−0.10, −0.03]	−0.20 [−0.31, −0.09]
Croatia	-71.34	-221.21	−0.10 [−0.16, −0.04]	−0.31 [−0.48, −0.14]
Italy	-4,569.30	-14,169.27	−0.23 [−0.36, −0.10]	−0.72 [−1.12, −0.32]
Portugal	-350.47	-1,086.79	−0.05 [−0.07, −0.02]	−0.14 [−0.22, −0.06]
Slovenia	-142.73	-442.61	−0.24 [−0.38, −0.11]	−0.75 [−1.35, −0.33]
Euro area	-5,957.91	-18,475.29	−0.04 [−0.07, −0.02]	−0.14 [−0.21, −0.06]
European Union	-6,533.21	-20,259.28	−0.04 [−0.06, −0.02]	−0.13 [−0.20, −0.05]

Notes: The table reports estimates of the economic impacts of floods on gross value added (GVA) of European Union countries. Individual country entries exclude those countries with 2029 impacts smaller than 0.1% and countries comprised of a single NUTS3 region. The results for these affected regions are still included in the overall euro area and European Union figures. Columns 2 and 3 present annual losses in million euros relative to the 2024 baseline. Columns 4 and 5 show the corresponding losses as a share of 2024 GVA. Entries are reported as the point estimate followed by the 90% confidence interval in brackets. These aggregates are based on identified events of summer 2025 floods at NUTS3 regional level. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

5.4 Combined losses

finally, we combine all GVA losses identified from three types of events at the NUTS3 level. The table below shows the cumulative economic losses in million euro for 2025 and 2029 both in absolute terms and as a share of GVA. Overall, we observe that different European countries are facing different risks from extreme weather events. The Southern European countries including Spain, Italy, Portugal and Greece are facing higher risks of heatwaves, and droughts. The Northern/Central countries like Denmark, Sweden, Germany show relatively lower damages but the frequency and magnitude of these events, especially floods, are also increasing across these regions. The smaller economies like Bulgaria, Malta and Cyprus are highly vulnerable economies, incurring substantial losses as percentage of GVA.

For France, the total estimated regional losses are €10.1 bn in 2025 and €33.9 bn by 2029, which is approximately equivalent to 0.39% and 1.3% of French 2024 GVA. For Italy, we project that total estimated regional losses are €11.9 bn in 2025 and €34.2 bn by 2029, which is approximately equivalent to, 0.61% and 1.75% of Italian 2024 GVA. Spain is one of the most affected countries where we identified all three types of events, as well as compound events. The total estimated regional losses in Spain are €12.2 bn in 2025 and €34.8 bn by 2029, which is approximately equivalent to 0.84% and 2.4% of Spanish 2024 GVA. For Germany, the estimated losses are much smaller in relative terms due to economic size, but absolute losses are not negligible. At the EU aggregate level, our estimates show that these regional level losses are equivalent to 0.78% GVA by 2029 – an economically significant potential loss.

Table 4: Combined losses (mn €) and shares of 2024 GVA (%)

	GVA loss (mn €)		Loss as share of GVA(%)	
Country	2025	2029	2025	2029
Austria	-443.07	-1373.94	-0.10	-0.32
Bulgaria	-974.69	-2563.37	-1.08	-2.84
Croatia	-113.29	-329.21	-0.16	-0.46
Cyprus	-338.47	-871.37	-1.14	-2.94
Denmark	-241.94	-741.25	-0.07	-0.21
France	-10108.56	-33956.13	-0.39	-1.30
Germany	-813.73	-2480.03	-0.02	-0.06
Greece	-2321.30	-5976.10	-1.13	-2.90
Italy	-11857.79	-34233.91	-0.61	-1.75
Malta	-236.52	-608.90	-1.14	-2.93
Poland	-350.47	-1086.79	-0.05	-0.14
Portugal	-1319.49	-3581.49	-0.53	-1.45
Romania	-1538.46	-3960.71	-0.48	-1.23
Slovenia	-142.73	-442.61	-0.24	-0.75
Spain	-12200.15	-34819.98	-0.84	-2.40
Sweden	-24.26	-62.47	0.00	-0.01
Euro area	-39544.63	-117586.90	-0.29	-0.86
European Union	-42674.45	-126001.49	-0.26	-0.78

Notes: The table reports the sum of projected economic losses from heatwaves, droughts, and floods for 2025 and 2029. Losses are expressed in million euros (mn €) and as a share of 2024 Gross Value Added (GVA). Negative values indicate reductions in GVA on average level. Estimates are based on coefficients derived by Usman et al. (2025).

6 Conclusion

Extreme weather events are increasingly having substantial economic impacts in Europe. With continued climate change, these impacts are likely to grow in the coming decades. Estimates of such losses often come with large delays, which can hamper the response by policymakers. This is particularly the case for events such as heatwaves where much of the economic impact comes from suppressed economic activity, rather than physical damage.

We propose an approach to estimate regional impacts of extreme events in real time, using up-to-date weather data and existing estimated historical impacts derived by Usman et al. (2025). Using this approach, we find that extreme weather events affected a quarter of NUTS3 regions in the European Union in the summer of 2025. The aggregate loss of economic activity is estimated to reach €43 billion in 2025. This is equivalent to 0.26% of European Union GVA. Based on average historical experience, affected regions are likely to witness a prolonged and intensifying impact on activity, reaching €126 billion in 2029, in 2024 euros.

Substantial uncertainty surrounds these estimates, arising from unknown spillovers to initially unaffected regions, the impact of adaptation following extreme events in recent years and the full impact of wildfires which have been widespread in summer 2025, but beyond the scope of the current approach. These estimates also do not capture all economic impacts of extreme events, such as the impact on food prices. Further research is needed to refine these results and provide policymakers with necessary information to react to such extreme events in an effective and timely fashion.

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Appendix

Table A1: Economic output losses from heatwaves at NUTS2 level

		Cum loss(mn €)		Share GVA(%)		GVA/capita(€)	
Country	Region	2025	2029	2025	2029	2025	2029
Bulgaria	Yugoiztochen	−16	−96	−0.14	−0.84	−17	−101
Spain	Comunidad Foral.	−295	−188	−1.22	−0.77	−428	−273
Spain	Aragón	−172	−1,021	−0.38	−2.26	−126	−745
Spain	Cataluña	−1,013	−6,012	−0.37	−2.20	−125	−740
France	Pays-de-la-Loire	−894	−570	−0.67	−0.43	−227	−145
France	Limousin	−32	−20	−0.16	−0.10	−43	−28
France	Languedoc-Roussillon	−1,237	−7,364	−1.40	−8.34	−415	−2,467
France	Midi-Pyrénées	−1,251	−6,515	−1.15	−5.97	−390	−2,030
France	Auvergne	−279	−278	−0.69	−0.69	−203	−202
France	Rhône-Alpes	−1,101	−5,527	−0.42	−2.10	−160	−802
Italy	Liguria	−68	−43	−0.13	−0.08	−45	−29
Italy	Toscana	−263	−1,559	−0.21	−1.23	−72	−427
Italy	Lazio	−164	−970	−0.07	−0.44	−29	−170

Notes: The table reports estimates of the economic impacts of heatwaves on gross value added (GVA) of the European Union regions at NUTS2 level. Columns 3 and 4 present annual cumulative losses in million euros relative to the 2024 baseline of the respective region. Columns 5 and 6 show the cumulative losses as share of baseline GVA in percentage terms. The last two columns show the €GVA per capita losses for year 2025 and 2029. These estimates are based on identified events of summer heatwaves 2025 at NUTS3 regional level. The numbers for year 2029 are cumulative losses. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

Table A2: Economic output losses from heatwaves at NUTS3 level

		Cumulative loss (mn €)		90% Confidence Intervals (mn €)	
Country	NUTS3 region	2025	2029	2025	2029
Bulgaria	Sliven	-16.10	-95.52	[-39 8]	[-142 -47]
Spain	Navarra	-294.55	-187.79	[-465 -123]	[-661 295]
Spain	Huesca	-111.59	-662.19	[-273 54]	[-983 -327]
Spain	Teruel	-60.46	-358.79	[-148 29]	[-532 -177]
Spain	Girona	-397.29	-2357.57	[-973 190]	[-3498 -1163]
Spain	Lleida	-207.60	-1231.94	[-508 100]	[-1828 -608]
Spain	Tarragona	-408.19	-2422.26	[-999 196]	[-3594 -1195]
France	Loire-Atlantique	-697.39	-444.62	[-1101 -290]	[-1565 698]
France	Sarthe	-196.66	-125.38	[-311 -82]	[-441 197]
France	Creuse	-31.67	-20.19	[-50 -13]	[-71 32]
France	Aude	-136.23	-808.39	[-334 65]	[-1199 -399]
France	Gard	-299.41	-1776.75	[-733 144]	[-2636 -877]
France	Hérault	-614.19	-3644.74	[-1504 294]	[-5408 -1799]
France	Lozère	-0.05	-21.25	[-15 15]	[-57 15]
France	Pyrénées-Orientales	-187.49	-1112.62	[-459 90]	[-1651 -549]
France	Aveyron	-95.57	-60.93	[-151 -40]	[-214 96]
France	Haute-Garonne	-934.35	-5544.61	[-2288 448]	[-8227 -2736]
France	Hautes-Pyrénées	-75.68	-48.25	[-120 -32]	[-170 76]
France	Tarn	-145.06	-860.81	[-355 70]	[-1277 -425]
France	Cantal	-0.09	-39.70	[-29 29]	[-107 29]
France	Haute-Loire	-0.13	-60.25	[-43 44]	[-163 44]
France	Puy-de-Dôme	-278.97	-177.86	[-441 -116]	[-626 279]
France	Ardèche	-109.78	-651.48	[-269 53]	[-967 -321]
France	Isère	-711.14	-4220.03	[-1741 341]	[-6261 -2082]
France	Loire	-278.77	-177.73	[-440 -116]	[-625 279]
France	Savoie	-0.42	-190.94	[-138 138]	[-515 139]
France	Haute-Savoie	-0.63	-286.60	[-207 207]	[-773 209]
Italy	Imperia	-67.83	-43.25	[-107 -28]	[-152 68]
Italy	Lucca	-176.79	-1049.13	[-433 85]	[-1557 -518]
Italy	Grosseto	-85.92	-509.88	[-210 41]	[-757 -252]
Italy	Frosinone	-163.54	-970.46	[-400 78]	[-1440 -479]

Notes: The table reports estimates of the economic impacts of heatwaves on gross value added (GVA) of the European Union regions at NUTS3 level. Columns 2 and 3 present annual losses in million euros relative to the 2024 baseline of the respective region. Columns 4 and 5 show the confidence intervals 90% range with lower bound first and upper bound second, rounded to the nearest whole number. Negative values indicate losses in GVA due to heatwaves. These estimates are based on identified events of summer heatwaves 2025 at NUTS3 regional level. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

Table A3: Economic output losses from droughts at NUTS2 level

		Cum loss (mn €)		Share GVA (%)		GVA/capita(€)	
Country	Regions	2025	2029	2025	2029	2025	2029
Spain	Comunidad Madrid	−3,234.26	−8,326.48	−1.14	−2.94	−455	−1,172
Italy	Lazio	−2,251.15	−5,795.49	−1.03	−2.64	−395	−1,016
Spain	Andalucía	−2,206.63	−5,680.89	−1.14	−2.94	−252	−649
France	Provence-Alpes-Côte	−2,029.74	−5,225.49	−1.12	−2.88	−387	−996
Italy	Campania	−1,367.25	−3,519.93	−1.14	−2.94	−245	−630
Spain	Com. Valenciana	−1,328.24	−3,419.49	−0.98	−2.53	−246	−634
Italy	Sicilia	−1,156.22	−2,976.64	−1.14	−2.94	−241	−621
Greece	Attiki	−1,143.50	−2,943.89	−1.14	−2.94	−303	−780
Romania	Bucuresti - Ilfov	−1,078.46	−2,776.46	−1.14	−2.94	−469	−1,206
France	Aquitaine	−967.90	−2,491.83	−0.81	−2.09	−267	−689
Italy	Puglia	−961.72	−2,475.92	−1.14	−2.94	−248	−637
Spain	Galicia	−853.69	−2,197.79	−1.14	−2.94	−311	−801
Portugal	Norte	−830.29	−2,137.55	−1.14	−2.94	−223	−574
Spain	Castilla y León	−782.18	−2,013.69	−1.14	−2.94	−323	−831
France	Poitou-Charentes	−663.54	−1,708.25	−1.14	−2.94	−359	−923
Spain	Castilla-la Mancha	−595.15	−1,532.20	−1.14	−2.94	−279	−718
France	Pays-de-la-Loire	−554.15	−1,426.63	−0.42	−1.07	−141	−362
Bulgaria	Yugozapaden	−491.00	−1,264.06	−1.08	−2.79	−245	−631
Spain	Illes Balears	−464.43	−1,195.66	−1.14	−2.94	−372	−958
Spain	Región de Murcia	−445.69	−1,147.41	−1.14	−2.94	−280	−722
Italy	Sardegna	−434.82	−1,119.44	−1.14	−2.94	−277	−714
Italy	Calabria	−408.88	−1,052.66	−1.14	−2.94	−223	−573
Spain	Aragón	−378.40	−974.19	−0.84	−2.16	−276	−711
Cyprus	Kypros	−338.47	−871.37	−1.14	−2.94	−341	−878
France	Bretagne	−318.65	−820.34	−0.29	−0.74	−92	−236
Greece	Kentriki Makedonia	−304.40	−783.67	−1.07	−2.76	−172	−442
Spain	Extremadura	−274.46	−706.59	−1.14	−2.94	−257	−661
France	Centre Val de Loire	−247.55	−637.30	−0.30	−0.77	−95	−246
Malta	Malta	−236.52	−608.90	−1.14	−2.94	−401	−1,031
France	Rhône-Alpes	−218.84	−563.40	−0.08	−0.21	−32	−82

Notes: The table reports estimates of the economic impacts of droughts on gross value added (GVA) of the European Union regions at NUTS2 level. Columns 3 and 4 present cumulative losses in million euros relative to the 2024 baseline of the respective region. Columns 5 and 6 show the losses as share of baseline GVA in percentage. The last two columns show the €GVA per capital losses in for year 2025 and 2029. These estimates are based on identified events of droughts during summer 2025 at NUTS3 regional level. As we have identified total 62 events of droughts at NUTS2 level, therefore, in the table above we are only showing the top 30 regions affected by droughts. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

Table A4: Economic output losses from droughts at NUTS3 level

Country	Regions	Cumulative loss (mn €)		90% Confidence Intervals (mn €)	
		2025	2029	2025	2029
Spain	Madrid	-3234.26	-8326.48	[-5599, -849]	[-13818, -2723]
Italy	Roma	-2091.13	-5383.52	[-3620, -549]	[-8934, -1761]
France	Bouches-du-Rhône	-966.19	-2487.42	[-1673, -254]	[-4128, -814]
France	Gironde	-739.95	-1904.97	[-1281, -194]	[-3161, -623]
Italy	Napoli	-748.22	-1926.27	[-1295, -196]	[-3197, -630]
Spain	Valencia/València	-824.68	-2123.11	[-1428, -216]	[-3523, -694]
Spain	Sevilla	-540.50	-1391.48	[-936, -142]	[-2309, -455]
Spain	Alicante/Alacant	-503.55	-1296.38	[-872, -132]	[-2151, -424]
Spain	Málaga	-446.73	-1150.09	[-773, -117]	[-1909, -376]
France	Alpes-Maritimes	-449.90	-1158.26	[-779, -118]	[-1922, -379]
Spain	Murcia	-445.69	-1147.41	[-772, -117]	[-1904, -375]
Bulgaria	Sofia (stolitsa)	-441.65	-1137.00	[-765, -116]	[-1887, -372]
Spain	Cádiz	-305.51	-786.51	[-529, -80]	[-1305, -257]
France	Var	-358.25	-922.30	[-620, -94]	[-1531, -302]
Italy	Bari	-351.70	-905.43	[-609, -92]	[-1503, -296]
Spain	A Coruña	-370.46	-953.75	[-641, -97]	[-1583, -312]
Spain	Zaragoza	-378.40	-974.19	[-655, -99]	[-1617, -319]
France	Maine-et-Loire	-299.60	-771.31	[-519, -79]	[-1280, -252]
Italy	Palermo	-298.03	-767.27	[-516, -78]	[-1273, -251]
Italy	Salerno	-264.27	-680.34	[-458, -69]	[-1129, -223]
Italy	Catania	-257.39	-662.64	[-446, -68]	[-1100, -217]
France	Vendée	-254.54	-655.31	[-441, -67]	[-1088, -214]
Italy	Lecce	-173.77	-447.35	[-301, -46]	[-742, -146]
Italy	Messina	-141.97	-365.49	[-246, -37]	[-607, -120]
Italy	Foggia	-136.27	-350.82	[-236, -36]	[-582, -115]
Italy	Taranto	-136.23	-350.72	[-236, -36]	[-582, -115]
Italy	Reggio di Calabria	-117.96	-303.69	[-204, -31]	[-504, -99]
Italy	Latina	-160.02	-411.96	[-277, -42]	[-684, -135]
Italy	Siracusa	-127.50	-328.25	[-221, -33]	[-545, -107]
France	Vienne	-167.96	-432.41	[-291, -44]	[-718, -141]

Notes: The table reports estimates of the economic impacts of droughts on gross value added (GVA) of the European Union regions at NUTS3 level. Columns 2 and 3 present annual losses in million euros relative to the 2024 baseline of the respective region. Columns 4 and 5 show the confidence intervals 90% range with lower bound first and upper bound second, rounded to the nearest whole number. Negative values indicate losses in GVA due to droughts. These estimates are based on identified events of summer heatwaves 2025 at NUTS3 regional level. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)). As we have identified total 195 events of droughts at NUTS3 level, therefore, in the table above we are only showing the top 30 regions affected by droughts. The numbers for year 2029 are cumulative losses. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

Table A5: Economic output losses from floods at NUTS2 level

		Cumulative loss (mn €)		Share of GVA (%)		GVA/capita (€)	
Country	Region	2025	2029	2025	2029	2025	2029
Austria	Steiermark	-63.02	-195.41	-0.11	-0.35	-49	-153
Austria	Salzburg	-82.23	-255.00	-0.25	-0.77	-143	-443
Austria	Tirol	-297.82	-923.53	-0.78	-2.41	-381	-1183
Germany	Freiburg	-52.55	-162.95	-0.05	-0.16	-23	-70
Germany	Oberbayern	-178.59	-553.79	-0.05	-0.17	-38	-117
Germany	Schwaben	-90.93	-281.97	-0.11	-0.33	-47	-146
Germany	Brandenburg	-47.88	-148.46	-0.05	-0.16	-19	-58
Germany	Mecklenburg-Vor	-361.52	-1121.07	-0.64	-1.99	-228	-708
Denmark	Sjælland	-224.83	-697.21	-0.64	-1.98	-261	-810
Croatia	Panonska Hrvatska	-13.73	-42.56	-0.11	-0.33	-14	-43
Croatia	Jadranska Hrvatska	-57.61	-178.65	-0.25	-0.78	-44	-137
Italy	Piemonte	-728.56	-2259.24	-0.51	-1.57	-172	-532
Italy	Lombardia	-2467.18	-7650.64	-0.55	-1.70	-247	-765
Italy	Veneto	-664.89	-2061.80	-0.37	-1.14	-137	-426
Italy	Friuli-Venezia G.	-371.98	-1153.48	-0.90	-2.78	-312	-967
Italy	Emilia-Romagna	-336.70	-1044.10	-0.19	-0.59	-76	-235
Poland	Kujawsko-Pomorskie	-47.46	-147.18	-0.15	-0.47	-25	-76
Poland	Warmińsko-Mazurskie	-58.01	-179.88	-0.31	-0.97	-45	-139
Poland	Pomorskie	-54.39	-168.67	-0.12	-0.37	-24	-74
Poland	Lubelskie	-190.60	-591.05	-0.70	-2.18	-99	-306
Slovenia	Vzhodna Slovenija	-42.17	-130.76	-0.17	-0.53	-38	-117
Slovenia	Zahodna Slovenija	-100.57	-311.86	-0.29	-0.90	-99	-307

Notes: The table reports estimates of the economic impacts of floods on gross value added (GVA) of the European Union regions at NUTS2 level. Columns 3 and 4 present annual losses in million euros relative to the 2024 baseline of the respective region. Columns 5 and 6 show the losses as share of baseline GVA in percentage. The last two columns show the €GVA per capital losses in for year 2025 and 2029. These estimates are based on identified events of floods during summer 2025 at NUTS3 regional level. The numbers for year 2029 are cumulative losses. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).

Table A6: Economic output losses from floods at NUTS3 level

		Cumulative loss (mn €)		90% CI (mn €)	
Country	Region	2025	2029	2025	2029
Italy	Milano	-1897.52	-5884.16	[-2956 -834]	[-9136 -2580]
Italy	Torino	-691.15	-2143.23	[-1077 -304]	[-3328 -940]
Italy	Vicenza	-302.12	-936.88	[-471 -133]	[-1455 -411]
Italy	Treviso	-297.12	-921.35	[-463 -131]	[-1431 -404]
Italy	Varese	-266.03	-824.96	[-414 -117]	[-1281 -362]
Denmark	Vest- og Sydsjælland	-224.83	-697.21	[-350 -99]	[-1083 -306]
Italy	Como	-172.66	-535.41	[-269 -76]	[-831 -235]
Italy	Udine	-161.60	-501.11	[-252 -71]	[-778 -220]
Austria	Innsbruck	-143.61	-445.33	[-224 -63]	[-691 -195]
Italy	Mantova	-130.96	-406.11	[-204 -58]	[-631 -178]
Italy	Forlì-Cesena	-128.28	-397.81	[-200 -56]	[-618 -174]
Italy	Ravenna	-121.95	-378.18	[-190 -54]	[-587 -166]
Austria	Tiroler Unterland	-121.63	-377.16	[-189 -53]	[-586 -165]
Poland	Lubelski	-108.55	-336.60	[-169 -48]	[-523 -148]
Italy	Pordenone	-94.20	-292.11	[-147 -41]	[-454 -128]
Germany	Rostock, Kreisfreie Stadt	-90.22	-279.77	[-141 -40]	[-434 -123]
Italy	Ferrara	-86.46	-268.12	[-135 -38]	[-416 -118]
Germany	Mecklenburgische Seenplatte	-79.20	-245.59	[-123 -35]	[-381 -108]
Italy	Trieste	-77.94	-241.70	[-121 -34]	[-375 -106]
Austria	Pinzgau-Pongau	-75.01	-232.62	[-117 -33]	[-361 -102]
Germany	Vorpommern-Greifswald	-65.81	-204.06	[-103 -29]	[-317 -89]
Italy	Belluno	-65.65	-203.57	[-102 -29]	[-316 -89]
Germany	Landkreis Rostock	-63.21	-196.00	[-98 -28]	[-304 -86]
Germany	Vorpommern-Rügen	-63.09	-195.65	[-98 -28]	[-304 -86]
Poland	Elbląski	-58.01	-179.88	[-90 -25]	[-279 -79]
Poland	Starogardzki	-54.39	-168.67	[-85 -24]	[-262 -74]
Germany	Oberallgäu	-52.91	-164.06	[-82 -23]	[-255 -72]
Germany	Waldshut	-52.55	-162.95	[-82 -23]	[-253 -71]
Croatia	Primorsko-goranska županija	-51.46	-159.57	[-80 -23]	[-248 -70]
Poland	Puławski	-50.45	-156.46	[-79 -22]	[-243 -69]

Notes: The table reports estimates of the economic impacts of floods on gross value added (GVA) of the European Union regions at NUTS3 level. Columns 2 and 3 present annual losses in million euros relative to the 2024 baseline of the respective region. Columns 4 and 5 show the confidence intervals 90% range with lower bound first and upper bound second, rounded to the nearest whole number. Negative values indicate losses in GVA due to floods. These estimates are based on identified events of floods during summer 2025 at NUTS3 regional level. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)). As we have identified total 53 events of floods at NUTS3 level, therefore, in the table above we are only showing the top 30 regions affected. The numbers for year 2029 are cumulative losses. All estimates are calculated from the empirical estimates derived by Usman et al. (2025)).