Appendix A Supplementary information

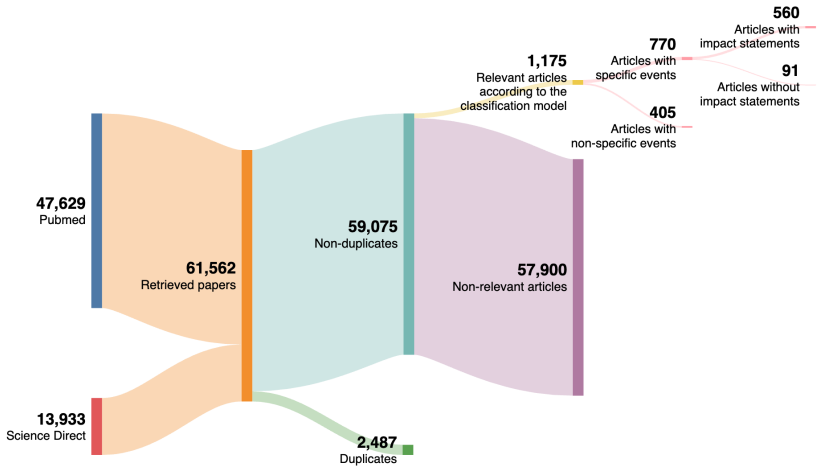

Fig. A1 Process used to select relevant articles for the machine-learning synthesis.

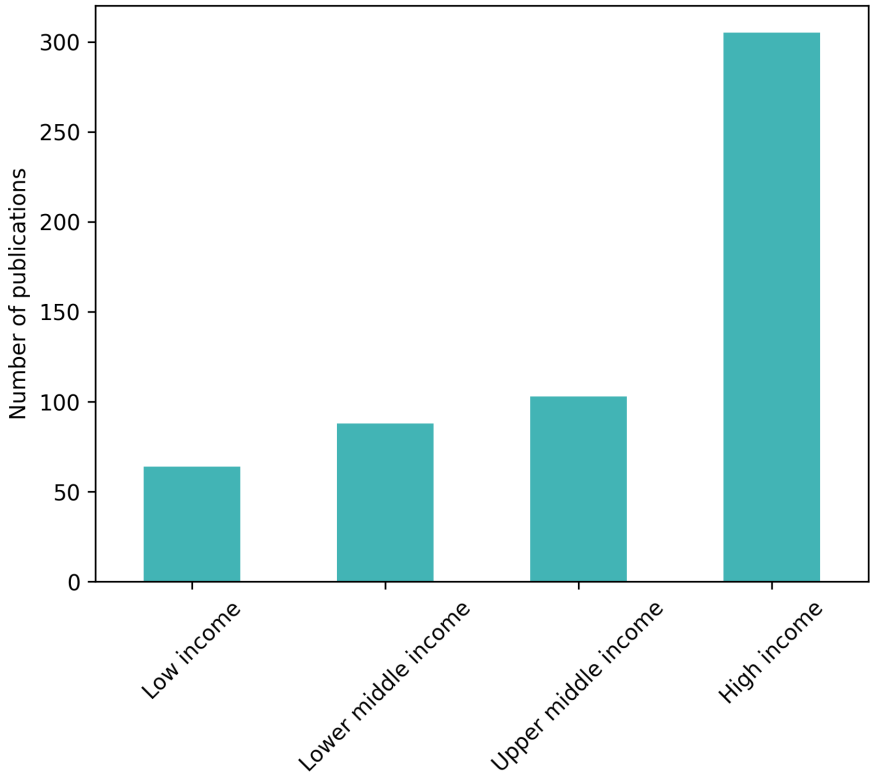

Fig. A2 Number of impact-related articles by country income level in 2024. Income level was obtained from the World Bank [63]. Bars represent the estimated article count for each income group.

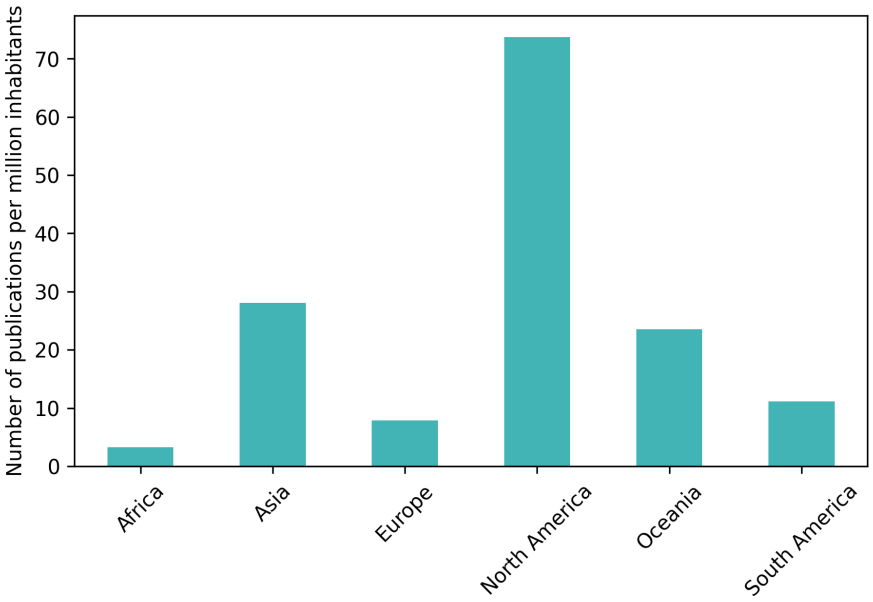

Fig. A3 Number of articles reporting on the impacts of climate hazards per continent, scaled by population size in 2024. Population size was obtained from the World Bank Open Data [65]. Bars represent the estimated article count for each continent.

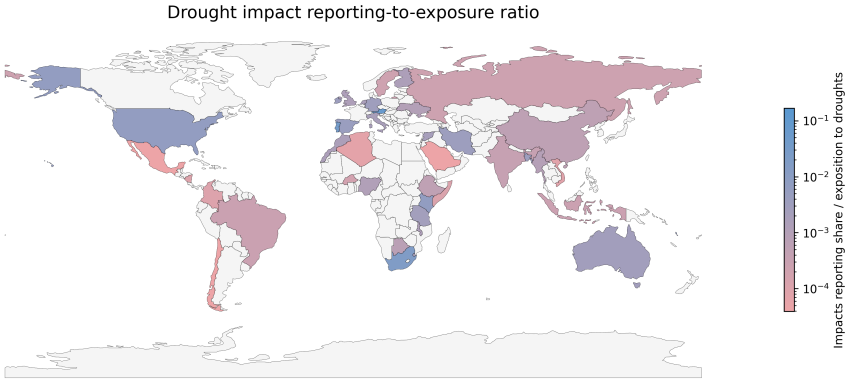

Fig. A4 The map displays the ratio between drought impacts reporting share and exposure to droughts, showing the balance between the frequency of reported drought impacts and the actual exposure to droughts. Exposure to droughts is the geometric mean of the annually averaged population exposed to three levels of drought intensity-strong ($SPEI \geq 2.0$), severe ($SPEI \geq 2.5$), and extreme ($SPEI \geq 3.0$). Positive values (blue shades) indicate higher reporting relative to exposure (likely over-reporting), while negative values (red shades) represent lower reporting relative to exposure (under-reporting). Darker colors indicate stronger discrepancies, with dark blue representing the highest levels of over-reporting and dark red representing the highest levels of under-reporting. Gray areas represent countries with no drought reporting.

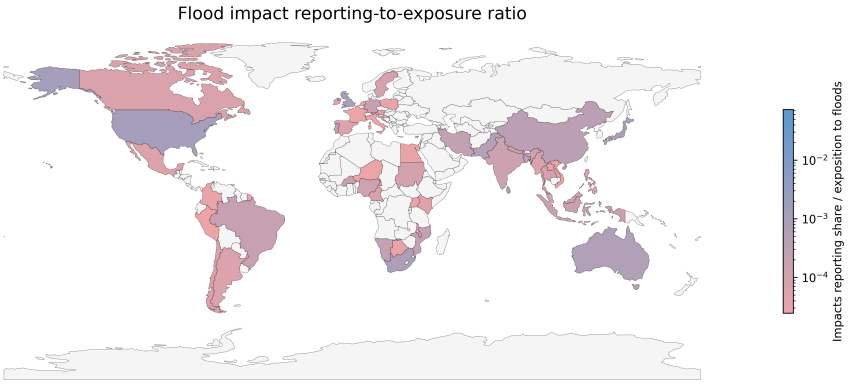

Fig. A5 The map displays the ratio between flood impacts reporting share and exposure to floods, showing the balance between the frequency of reported flood impacts and the actual exposure to riverine floods. Exposure to riverine floods is the geometric mean of the annually averaged population exposed to three levels of inundation intensity: strong intensity (inundation height $\geq 0.5m$), severe intensity (inundation height $\geq 1.0m$), and extreme intensity (inundation height $\geq 2.0m$). Positive values (blue shades) indicate higher reporting relative to exposure (likely over-reporting), while negative values (red shades) represent lower reporting relative to exposure (under-reporting or low awareness). Darker colors indicate stronger discrepancies, with dark blue representing the highest levels of over-reporting and dark red representing the highest levels of under-reporting. Gray areas represent countries with no flood reporting.

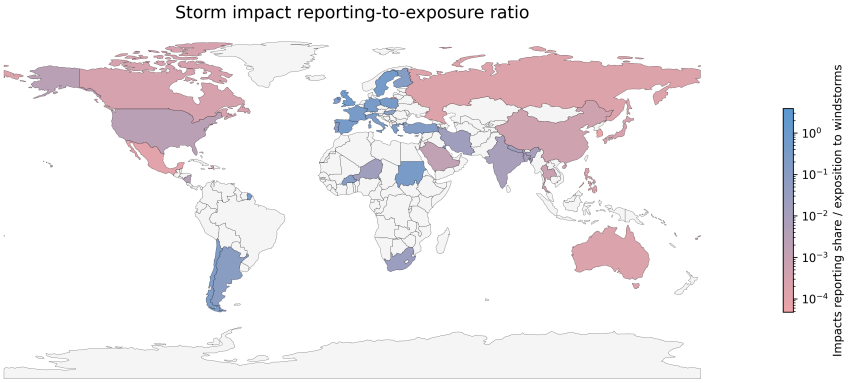

Fig. A6 The map displays the ratio between storm impacts reporting share and exposure to windstorms, showing the balance between the frequency of reported flood impacts and the actual exposure to riverine windstorms. Exposure to windstorms is the geometric mean of the annually averaged population exposed to three levels of wind intensity: strong intensity (sustained speeds 119 km/h or higher), severe intensity (sustained speeds 154 km/h or higher), and extreme intensity (sustained speeds 178 km/h or higher). Positive values (blue shades) indicate higher reporting relative to exposure (likely over-reporting), while negative values (red shades) represent lower reporting relative to exposure (under-reporting or low awareness). Darker colors indicate stronger discrepancies, with dark blue representing the highest levels of over-reporting and dark red representing the highest levels of under-reporting. Gray areas represent countries in our dataset with no reporting on storm impacts.

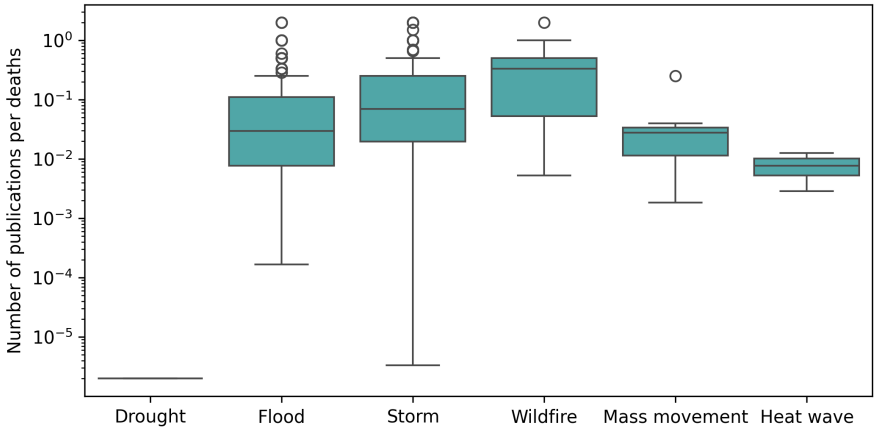

Fig. A7 Logarithmic ratio of research publications to the number of fatalities according to different hazards, based on extreme events cross-referenced with EM-DAT records.

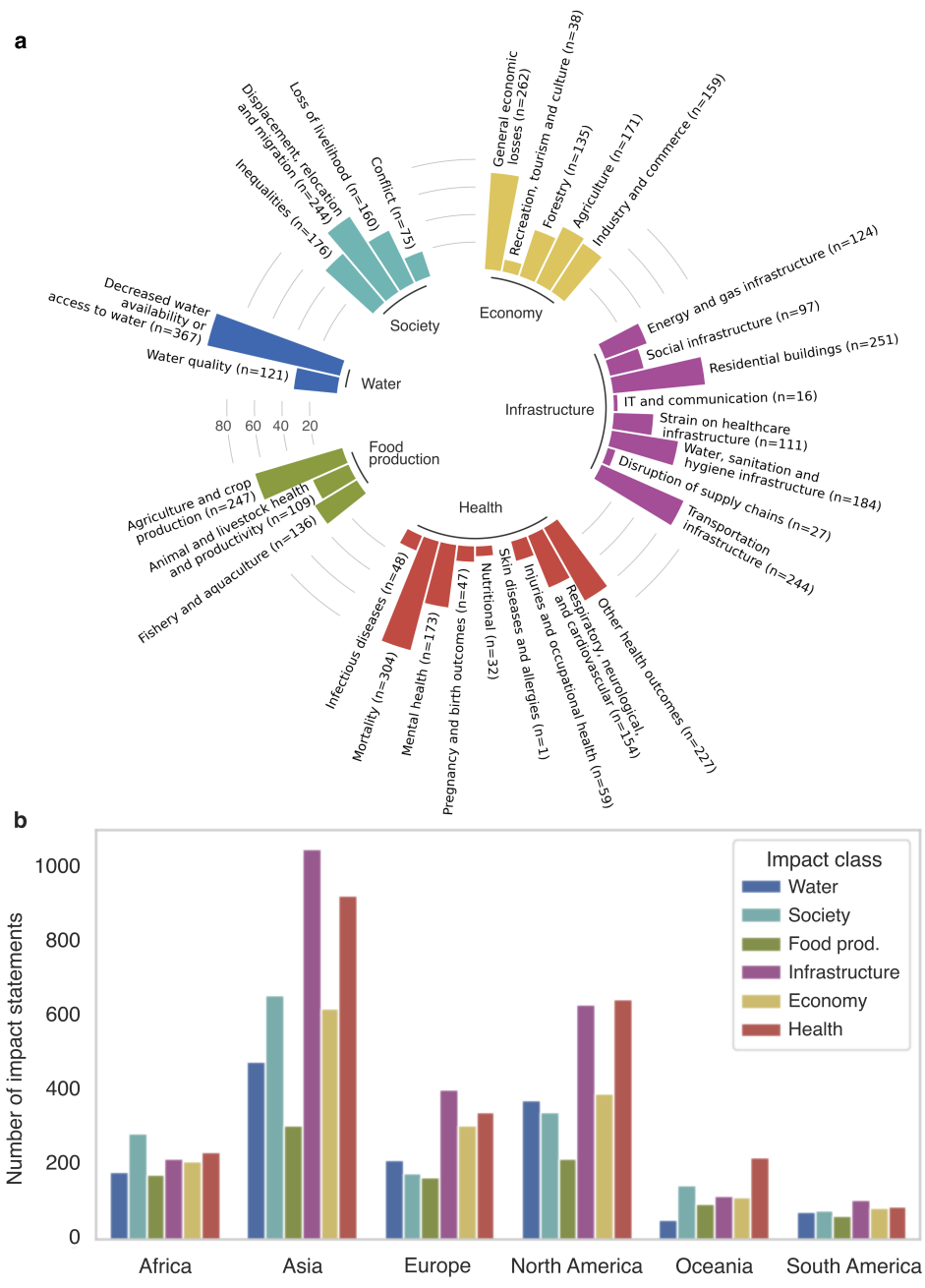

Fig. A8 Number of impact statements (i.e., sentences identified and classified as reporting specific impacts) identified in the article full texts: (a) grouped into six main impact classes — Water, Society, Food production, Health, Infrastructure, and Economy — with further subdivisions; and (b) distributed by continent.

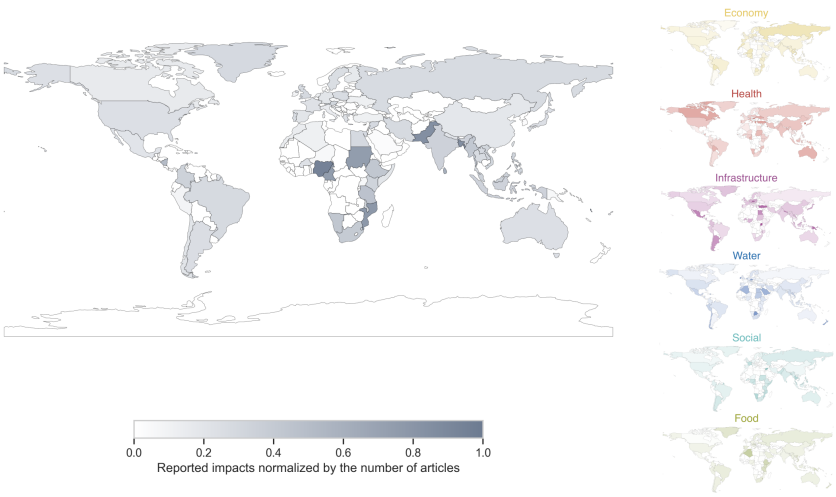

Fig. A9 Impact statements normalized by the total number of published articles in each country.

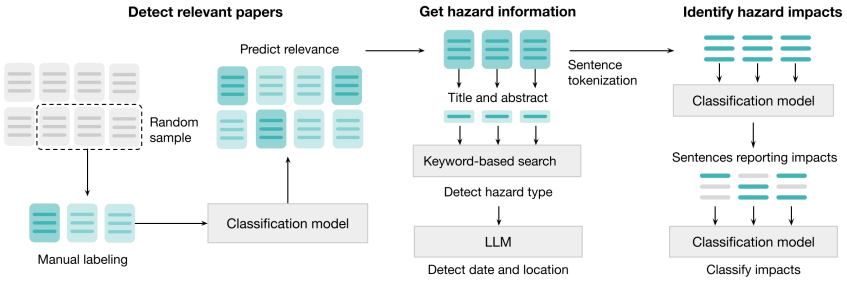

Fig. A10 Detailed methodology description.

Appendix B Extended methods

Table B1 Typology of socioeconomic impacts.

Impact class	Subclass
Society	Conflict (CFLC)
	Loss of livelihood (LVLH)
	Displacement, relocation, and migration (DISP)
	Inequality (INEQ)
Water	Water availability or access to water (AVLB)
	Water quality (QUAL)
Food production	Agriculture and crop production (AGRI)
	Animal and livestock health and productivity (ANIM)
	Fishery and aquaculture (FISH)
Health	Infectious diseases (INFC)
	Mortality (MORT)
	Mental health (MIND)
	Pregnancy and birth outcomes (PREG)
	Nutritional (NUTR)
	Skin diseases and allergies (SKIN)
	Injuries and occupational health (OCC)
	Respiratory, neurological, and cardiovascular (RESP)
	Other diseases/health outcomes (OTHER)
Infrastructure	Physical damage to transportation infrastructure (TRSP)
	Supply chains (SPPLY)
	Water, sanitation, and hygiene infrastructure (SANIT)
	Strain on healthcare infrastructure (STRAIN)
	IT and communication (IT)
	Residential buildings (RESI)
	Social and critical infrastructure (PUBL)
	Energy and gas infrastructure (ENER)
Economy	Economic losses to industry and commerce (INDS)
	Economic losses to agriculture (AGRC)
	Economic losses to forestry (FRST)
	Economic losses to recreation, tourism, and culture (RECR)
	General economic losses (ECOG)

Table B2 Classification evaluation of socioeconomic impacts.

Impact class	Precision	Recall	F-score	Support
CFLC	1.00	0.50	0.67	2
LVLH	1.00	1.00	1.00	3
DISP	0.83	1.00	0.91	5
INEQ	0.80	1.00	0.89	4
AVLB	0.90	0.90	0.90	10
QUAL	1.00	0.50	0.67	2
AGRI	1.00	0.90	0.95	10
ANIM	1.00	1.00	1.00	6
FISH	0.75	1.00	0.86	3
INFC	0.50	1.00	0.67	2
MORT	1.00	0.90	0.95	10
MIND	0.89	1.00	0.94	8
PREG	1.00	1.00	1.00	1
NUTR	1.00	0.67	0.80	3
SKIN	1.00	0.50	0.67	2
OCC	1.00	0.60	0.75	5
RESP	0.92	1.00	0.96	12
OTHER	0.83	1.00	0.91	10
TRSP	0.88	1.00	0.93	7
SUPPLY	0.50	1.00	0.67	2
SANIT	1.00	1.00	1.00	6
STRAIN	1.00	1.00	1.00	9
IT	1.00	0.50	0.67	2
RESI	0.71	1.00	0.83	5
PUBL	0.75	1.00	0.86	3
ENER	0.78	1.00	0.88	7
INDS	1.00	0.80	0.89	5
AGRC	0.67	1.00	0.80	6
FRST	1.00	1.00	1.00	2
RECR	0.80	1.00	0.89	4
ECOG	1.00	1.00	1.00	10
micro avg	0.88	0.93	0.90	166
macro avg	0.89	0.90	0.87	166
weighted avg	0.90	0.93	0.90	166
samples avg	0.88	0.93	0.89	166

Table B3: Hazard and impact query terms used to identify articles reporting on the impacts of various climatological, hydrological, and meteorological extreme events. Wildcard symbols (! and ?) were included to capture variations in terminology and spelling. The ! symbol allows for plural and variant endings (e.g. "flood" and "floods", "fatality" and "fatalities"), while the ? symbol enables single-character variations (e.g. "heatwave" and "heat wave") for comprehensive search coverage.

Hazard terms
Multi-hazards
multi-hazard OR "several hazards" OR "compound hazard!"
Drought
drought! OR dry spell!
Flood
flood! OR inundation! OR Glacial lake outburst
Storm
storm! OR superstorm! OR wind?storm! OR snow?storm! OR blizzard! OR derecho OR winter?storm! OR hail OR extra?tropical?storm OR thunderstorm! OR tornado! OR tropical?cyclone OR storm surge! OR hurricane! OR typhoon
Heatwave
heat?wave OR heat episode! OR ((heat OR hot) AND spell!) OR heat?stress
Coldwave
cold?wave! OR severe winter conditions OR cold spell
Mass movement
landslide! OR rock?fall OR mudslide OR mass movement
Wildfire
forest?fire! OR wild?fire! OR land?fire OR bush?fire

Impact terms
impact! OR consequence! OR effect! OR damage! OR loss!
Social
violen! OR crime! OR war! OR conflict! OR dispute! OR unemploy! OR poverty OR income
Water availability
"water scarcity" OR "water supply" OR "water availability" OR "lack of water" OR "hydrological stress" OR "drinking water" OR (water AND (chlorophyll OR nitrogen OR phosphorus OR quality OR pollution OR heavy metal! OR pesticide!)) OR algae?bloom
Food production
(food AND (security OR supply OR food production)) OR famine OR livestock OR cattle! OR (animal AND (well-being OR husbandry OR welfare OR nutrition)) OR fishery! OR aquaculture OR fish stock
Health and wellbeing
health! OR well?being OR ill OR illness OR disease! OR syndrome! OR infect! OR medical! OR disabilit! OR death! OR fatalit! OR died OR casualties OR "loss of life" OR injur! OR infectious disease! OR cholera OR giardiasis OR cryptosporidiosis OR leptospirosis OR "(obes! OR over?weight OR under?weight OR hunger OR stunting OR wasting OR undernourish! OR undernutrition OR anthropometr! OR malnutrition OR malnour! OR anemia OR anaemia OR ""micro?nutrient!"" OR diabet!)" OR mental OR depress! OR !stress! OR anxi! OR ptsd OR psycho! OR psychiatric! OR !trauma! OR post-traumatic OR suicide! OR solastalgi! OR "air quality" OR "air pollution" OR PM2.5 OR "fine particulate" OR asthma OR displacem! OR relocation! OR migration OR refugee! OR homeless! OR emergency shelter
Cities, settlement, and infrastructure
bridge! OR road! OR highway! OR train! OR transport! OR rail! OR ship OR mobility OR ((water OR waste?water) AND treatment plant!) OR sewage! OR sewer! OR sewerage! OR waste OR landfill OR ((water OR waste?water) AND treatment plant!) OR sewage! OR sewer! OR sewerage! OR waste OR landfill OR hospital! OR care clinic! OR emergenc! OR pharmac! OR digital infrastructure OR communication infrastructure OR ((mobile OR !phone OR internet) AND (network! OR system!)) OR energy OR electricity OR heating OR gas supply OR biogas OR ((wind OR hydro OR nuclear OR coal OR thermal) AND power) OR propert! OR house! OR building! OR infrastructure!
Economic sectors
(macroeconomic AND loss) OR economic assets OR capital OR companies OR business! OR industr! OR commerce OR crop! losses OR crop yield! OR crop quality OR crop failure OR yield loss! OR agriculture OR forest dieback OR forest damage OR tree vitality OR tree growth OR tree dieback OR forestry OR die?off OR tourism OR tourist! OR hotel! OR museum! OR culture OR cultural OR recreation!

Table B4: LLM prompts used to extract information on the investigated hazard, event dates, and affected locations. If the answer to the first prompt is 0, the article is discarded. If the answer to the second prompt is 0, the associated hazard event is discarded. *hazardtype* refers to the hazard identified using the keyword-based approach

Check if the study investigates a specific event
Using only information from the text above, answer the query. Query: Does the text refer to a study that addresses one or more climate hazard events (i.e. it investigates the consequences of one or more events that happened on specific dates and locations)? If yes, answer 1. If not, answer 0. Answer with either 1 or 0 and do not add extra text or notes.
Check if hazard detected with keyword-based search is investigated
Context information is below. Using only information from the text above and no previous knowledge, please answer the query. Query: Did a *hazardType* event occur in the study area defined in the research, and was it explicitly investigated as part of the study? Answer with 1 or 0. If yes, answer 1. If not, answer 0. Answer with either 1 or 0 and do not add extra text or notes.

Extract hazard location

Context information is below.
Using only information from the text above and no previous knowledge, please answer the query.
Query: Where happened the *hazardType* event investigated in the study? For each unique country where the event occurred, extract, if possible:
"country": Country affected by the *hazardType* event, mandatory field
"region": Regions within the country affected by the *hazardType* event
"state": States within the country affected by the *hazardType* event
"city": Cities within the country affected by the *hazardType* event
"locationAnnotation": Provide the text excerpt from where you extracted the location information
If any of these information is missing from the text, leave the item empty. Do not add notes or extra text.
Provide the answer in JSON format.
Here is an example of how the structure of the JSON must be:
{"hazardLocation":
[{
"country": "China",
"region": "Guizhou Province",
"state": "Shuicheng County",
"city": "Liupanshui City",
"locationAnnotation": "On July 23, 2019, a landslide occurred in Shuicheng County, Liupanshui City, Guizhou Province." }]
}

Extract hazard date

Using only information from the text above and no previous knowledge, please answer the query. Query: When did the *hazardType* event that affected *hazardLocation* investigated in the study happened? The date in which the hazard happened should be described by: "startYear": starting year, four numeric values "YYYY"
"startMonth": starting month, one or two numeric values "MM"
"startDay": starting day, one or two numeric values "DD"
"endYear": ending year, four numeric values "YYYY"
"endMonth": ending month, one or two numeric values "MM"
"endDay": ending day, one or two numeric values "DD"
"hazardName": If the hazard received a special name, such as "Hurricane Harvey" or "Storm Sandy", add it here, enclosed by double quotes
If end year, end month, and end day are not mentioned in the text, repeat the values for start year, start month, and start day.
Provide the answer in JSON format.
If information is missing, leave it empty. Do not add notes or extra text.
Here is an example of how the structure of the JSON must be:
{"hazardDate": [{
"startYear": "2017",
"startMonth": "8",
"startDay": "30",
"endYear": "2017",
"endMonth": "9",
"endDay": "13",
"hazardName": "Hurricane Irma" },
{"startYear": "2017",
"startMonth": "9",
"startDay": "16",
"endYear": "2017",
"endMonth": "9",
"endDay": "30",
"hazardName": "Hurricane Maria" }] }

Table B5: List of 39 studies annotated at the sentence level. These constitute the validation dataset used to evaluate model performance in the identification of reported impacts and their classification into one or more of the 31 impact classes.

Title	Year	DOI
Social sensing of flood impacts in India: A case study of Kerala 2018	2022	10.1016/j.ijdrr.2022.102908
Maladaptation, fragmentation, and other secondary effects of centralized post-disaster urban planning: The case of the 2011 "cascading" disaster in Japan	2021	10.1016/j.ijdrr.2021.102219
Impact of the 2018 European drought on microbial groundwater quality in private domestic wells: A case study from a temperate maritime climate	2021	10.1016/j.jhydrol.2021.126669
Impact of heavy rains of 2018 in western Japan: disaster-induced health outcomes among the population of Innoshima Island	2020	10.1016/j.heliyon.2020.e03942
Factors associated with self reported mental health of residents exposed to Hurricane Harvey	2019	10.1016/j.pdisas.2019.100016
Anatomy of the 2016 drought in the Northeastern United States: Implications for agriculture and water resources in humid climates	2017	10.1016/j.agrformet.2017.08.024
Agricultural and food security impacts from the 2010 Russia flash drought	2021	10.1016/j.wace.2021.100383
Brief communication: Critical infrastructure impacts of the 2021 mid-July western European flood event	2022	10.5194/nhess-22-3831-2022
Heatwave fatalities in Australia, 2001–2018: An analysis of coronial records	2022	10.1016/j.ijdrr.2021.102671
Severity of drought and heatwave crop losses tripled over the last five decades in Europe	2021	10.1088/1748-9326/abf004
Heatwave Damage Prediction Using Random Forest Model in Korea	2020	10.3390/app10228237
Health impact analysis of PM2.5 from wildfire smoke in Canada (2013–2015, 2017–2018)	2020	10.1016/j.scitotenv.2020.138506
An overview of the impact of Hurricane Harvey on chemical and process facilities in Texas	2011	10.1061/(ASCE)CF.1943-5509.0000213
Psychological impact of the hurricane Mitch in Nicaragua in a one-year perspective	2001	10.1007/s001270050298
A systematic assessment of the effects of extreme flash floods on transportation infrastructure and circulation: The example of the 2017 Mandra flood	2020	10.1016/j.ijdrr.2020.101542
The 2022 Summer record-breaking heatwave and health information-seeking behaviours: an infodemiology study in Mainland China	2023	10.1136/bmjgh-2023-013231

Table B5: List of 39 studies annotated at the sentence level. These constitute the validation dataset used to evaluate model performance in the identification of reported impacts and their classification into one or more of the 31 impact classes.

Title	Year	DOI
A cold wave of winter 2021 in central South America: characteristics and impacts	2023	10.1007/s00382-023-06701-1
Prenatal exposure to sand and dust storms and children's cognitive function in China: a quasi-experimental study	2018	10.1016/S2542-5196(18)30068-8
Effects of drought on freshwater ecosystem services in poverty-stricken mountain areas	2019	10.1016/j.gecco.2019.e00537
The unprecedented spatial extent and intensity of the 2021 summer extreme heatwave event over the Western North American regions	2023	10.1016/j.wace.2023.100576
The effects of the Australian bushfires on physical activity in children	2023	10.1016/j.envint.2020.106214
The Melbourne epidemic thunderstorm asthma event 2016: an investigation of environmental triggers, effect on health services, and patient risk factors	2018	10.1016/s2542-5196(18)30120-7
Impact of fine particulate matter (PM2.5) smoke during the 2019 / 2020 Australian bushfire disaster on emergency department patient presentations	2022	10.1016/j.joclim.2022.100113
A multidisciplinary investigation of Storms Ciara and Dennis, February 2020	2023	10.1016/j.ijdrr.2023.103657
From a drought to HIV: An analysis of the effect of droughts on transactional sex and sexually transmitted infections in Malawi	2022	10.1016/j.ssmph.2022.101221
The impact of the 2014–2016 drought in Greater Letaba Local Municipality: How the farmers coped and factors that were significantly associated with loss of animals	2020	10.1016/j.ijdrr.2020.101869
Impact of major earthquakes on the incidence of acute coronary syndromes – A systematic review of the literature	2018	10.1016/j.hjc.2018.05.005
Preparedness, Hurricanes Irma and Maria, and Impact on Health in Puerto Rico	2022	10.1016/j.ijdrr.2021.102657
Storm Impact and Depression Among Older Adults Living in Hurricane Sandy-Affected Areas	2017	10.1017/dmp.2016.189
After the Storm: Short-term and Long-term Health Effects Following Superstorm Sandy among the Elderly	2019	10.1017/dmp.2018.152
Assessing health impacts of the December 2013 Ice storm in Ontario, Canada	2016	10.1186/s12889-016-3214-7

Table B5: List of 39 studies annotated at the sentence level. These constitute the validation dataset used to evaluate model performance in the identification of reported impacts and their classification into one or more of the 31 impact classes.

Title	Year	DOI
Brief communication: Critical infrastructure impacts of the 2021 mid-July western European flood event	2022	10.5194/nhess-22-3831-2022
The impact of hurricane strikes on cruise ship and airplane tourist arrivals in the Caribbean	2021	10.1177/13548166211037406
Tree mortality following drought in the central and southern Sierra Nevada, California, U.S.	2019	10.1016/j.foreco.2018.09.006
Local Perception of Drought Impacts in a Changing Climate: The Mega-Drought in Central Chile	2017	10.3390/su9112053
Drought Impacts and Compounding Mortality on Forest Trees in the Southern Sierra Nevada	2019	10.3390/f10030237
Impacts of flood on health: epidemiologic evidence from Hanoi, Vietnam	2011	10.3402/gha.v4i0.6356
Climate Change in Fisheries and Aquaculture: Analysis of the Impact Caused by Idai and Kenneth Cyclones in Mozambique	2021	10.3389/fsufs.2021.714187

Appendix C Annotation guidelines

C.1 Event description: hazard type, location and date

An event is a climate hazard event that occurs in one or more locations with information available for at least the start or end year. Each event is characterized by:

Hazard type: Must be one of the following: drought, flood, storm, heat wave, cold wave, mass movement or wildfire.
Location: Specify the geographic location, including country, state, city, or any other relevant place name.
Date: Enter the start and end dates, including year, month, and day for each.

C.2 Classification of impact statements

The main goal of this task is to accurately classify sentences based on the impacts they report. Impacts are categorized into six main classes, each with its own set of subclasses. This hierarchical structure ensures that the nuanced and diverse types of impacts in scientific literature are appropriately captured.

What you'll be doing as an annotator

- Read the sentences: Review the provided sentences extracted from scientific papers.
- Understand Context: Ensure you comprehend the context of the sentence to correctly identify the type of impact it describes.
- Classify the sentences: Assign the appropriate class and subclass based on the sentence's content and the provided definitions for each category.
- Annotate the sentences consistently: Follow the guidelines carefully to ensure consistency across annotations.

The main classes for annotating qualitative information are: economy, health, society, agriculture/food, infrastructure and water.

1. Society impacts (SOCIAL)
These might include an increase in violence, crime rates, and conflicts. Hazards can also incur losses of livelihood (e.g. by disrupting businesses, agriculture, industry and reducing the number of job opportunities and/or income) and force people to relocate temporarily or permanently.

Conflict (CFLC): Extreme events can create social instability, including increased crime, civil unrest, or conflicts over scarce resources like food and water. Inequitable aid distribution can also lead to conflicts.

Example: Among Hurricane Sandy impact variables, injury during the storm, greater number of storm stressors, and post-storm crime were associated with a higher probability of depression.

Loss of livelihood (LVLH): Extreme events can disrupt businesses, agriculture, industry, affecting employment and income.

Example: The population has plummeted over the years due to high unemployment rates and rising poverty levels as well as the lasting impact of Hurricane Maria.

Displacement, relocation, and migration (DISP): The loss caused by extreme events can force people to relocate temporarily or permanently. Damage to the economy can prompt economic migration.

Example: At least 3000 inhabitants in the district became homeless from the hurricane.

Inequalities (INEQ): Extreme events can deepen existing social inequalities. Vulnerable populations may have limited access to resources, information, and services that are crucial for response, and recovery. Recovery efforts might favor more affluent groups, leaving vulnerable communities further disadvantaged.

Example: The authors suggested that property damage and loss of services were greater contributors to adverse health following an extreme event among whites and individuals of high socioeconomic status, as they are more dependent on having easy access to health services and resources than low socioeconomic status groups that experienced more sporadic access prior to the event.

2. Impacts to water quality or quantity (WATER)

Hazards can alter water availability directly (e.g. prolonged droughts can lead to depleted reservoirs and reduced groundwater recharge) or indirectly (e.g. storms can cause the contamination of water sources).

Decreased water availability or access to water (AVLB): Hazards can alter water availability directly (e.g. prolonged droughts can lead to depleted reservoirs and reduced groundwater recharge) or indirectly (e.g. earthquakes can damage water supply infrastructures). Decreased water availability increases the need for irrigation and for additional water sources.

Example: This extremely long span of water crisis forced people to refrain from using restrooms or exercising other sanitary activities.

Water quality (QUAL): Disasters may damage water sources and lead to water contamination. Floods can cause the contamination of drinking water wells. Droughts can reduce water levels, concentrating pollutants. Storm surges can lead to saline intrusions.

Example: In the Netherlands, there have been problems with waste deposits along the river banks, which is mostly the solid waste transported by the river from further

upstream.

3. Impacts to food production (FOOD)

Direct or indirect damages to crops, by affecting soil fertility, promoting pests and diseases, and damaging infrastructure. Hazards can also result in livestock productivity losses and mortality and can negatively affect fish health and productivity.

Agriculture and crop production (AGRI): Disasters can damage crops directly and indirectly by affecting soil fertility, promoting pests and diseases, and damaging infrastructure. Droughts reduce crop yields and affect crop quality. Floods can drown crops, wash away nutrients, and deposit debris and sediment, which can damage crops. Excessive moisture can also promote fungal diseases.

Example: The timing and characteristics of the drought and heat wave were especially damaging for both wheat crops.

Animal and livestock health and productivity (ANIM): Hazards often result in livestock productivity losses and mortality. Heat stress, humidity, droughts, and floods can cause physiological stress, reduce animal health and reproduction, and ultimately, lower milk and meat production.

Example: After the drought, the average number of animals that farmers owned dropped to 21.64 (SD = 18.51).

Fishery and aquaculture (FISH): Hazards can damage breeding habitats. Lower oxygen levels due to droughts can stress or kill aquatic species. Heatwaves can cause thermal stress, which can negatively affect fish health and productivity.

Example: The nation sustained tremendous damage to all the major sources of economy, including agriculture, forestry, and fishery, amounting to a loss of ¥1.09 trillion (US$9.86 billion).

4. Health impacts (HEALTH)

Besides physical injuries and fatalities, hazards can lead to an increase in the incidence of infectious diseases, mental health issues, under-nutrition, and obesity rates (e.g. excess respiratory-related cases associated with thunderstorms).

Infectious diseases (INFC): Disasters can lead to outbreaks of waterborne diseases such as cholera, typhoid, and dysentery. The interruption of health care facilities can lead to the spread of infections. Flooding and stagnant water can create breeding grounds for mosquitoes, increasing the risk of vector-borne diseases like malaria, dengue fever, and Zika virus.

Example: For example, work by Levy et al. (2016), which investigated the impact of climate change on waterborne diseases noted that literature relating to drought

and disease was "particularly sparse" even when including all water exposures (i.e., surface water, groundwater etc.).

Mortality (MORT): Hazards cause fatalities directly through their immediate physical impacts. Fatalities can also happen due to long-term consequences to health and food insecurity.

Example: The flash flood caused 24 fatalities, rendering it the deadliest flood in Greece in the last 40 years (since the 1977 Athens disaster).

Mental health (MIND): Disasters can cause acute stress disorder, PTSD, trauma, depression, anxiety disorders, and substance use disorders.

Example: The prevalence of depressive symptoms was significantly higher than the rate of 9.8% previously reported in NYC senior centersReference Berman and Furst31 (z=2.31, P=0.02).

Pregnancy and birth outcomes (PREG): Disasters often interrupt access to regular healthcare services. Exposure to environmental contaminants can pose risks to both maternal and fetal health, potentially leading to congenital anomalies, preterm birth, and other adverse outcomes. Mental health issues during pregnancy are also linked to poor birth outcomes, including preterm birth and low birth weight.

Example: Several studies show evidence that prenatal exposure to dust events significantly lowers birthweight, reduces gestational time, and increases infant mortality.7, 8

Nutrition (NUTR): Disasters can lead to malnutrition, starvation, undernutrition due to food insecurity, obesity, diet changes.

Example: Acute decompensation of heart failure after an earthquake was associated with higher blood pressure, interruption of drugs, inflammation, malnutrition, and fluid retention.

Skin diseases and allergies (SKIN): Hazards can increase exposure to allergens, pollutants, and irritants. Floods and storms can lead to mold growth and spread of pollutants, triggering skin conditions like eczema and allergic reactions. Droughts and heatwaves can cause dry skin, making it more susceptible to infections and irritation, while wildfires release particulates that can aggravate skin allergies.

Example: And almost all dermatitis cases reported were diagnosed by the health staff after the flood.

Injuries and occupational health (OCC): Hazards cause physical injuries from debris and unsafe structures. Droughts and heatwaves can lead to hazardous working conditions in agriculture due to dust, exacerbating occupational health risks.

Example: Additionally, injury had over a 2.2-fold increased risk for all time periods following the storm, and effects 4 months (RR, 2.31; 95% CI, 2.30-2.32) and 12 months (RR, 2.30; 95% CI, 2.30-2.31) after the storm were greatest among women.

Respiratory, neurological, and cardiovascular (RESP): Both high and low temperatures may lead to respiratory and cardiovascular diseases, strokes, and myocardial infarction. Wildfire smoke is associated with respiratory diseases, such as asthma and coughing.

Example: Our findings suggest that in addition to the immediate health effects, the effects of hurricanes on health (CVD, respiratory disease, and injury) among the elderly population can last for 1 year following the storm period., Subsequently, as demonstrated in this study, wildfire smoke resulted in an increase in respiratory-related patient presentations to the ED.

Other diseases/health outcomes (OTHER): Hazards can lead to a variety of health issues, such as chronic health conditions. This class includes articles which do not mention specifically the type of health impact.

Example: One recent study in the US Virgin Islands29 found that older adults and people with chronic disease faced the most adverse health impacts of Hurricanes Irma and Maria.

5. Impacts to social and critical infrastructure (INFRA)

Widespread physical damage to transportation, water, sanitation, healthcare, IT, communication, residential, social, energy, and gas infrastructure, along with supply chain disruptions and reduced energy production.

Physical damage to transportation infrastructure (TRSP): Hazards can cause direct damage to roads, bridges, railways, highways.

Example: FEMA lost visibility of about 38% of its commodity shipments to Puerto Rico, worth an estimated $257 million.

Disruption of supply chains (SUPPLY): Hazards often damage infrastructure and transportation routes, which can disrupt logistics and cause delays. Droughts can impact agricultural production, leading to shortages.

Example: Imports will be necessary to fund the production chain. The sugar-energy sector had also already accumulated losses due to drought since 2021.

Physical damage to water, sanitation and hygiene infrastructure (SANIT): Water storage and supply, waste disposal and collection, wastewater collection and treatment, urban and rural drainage systems.

Example: Adding to the difficulty, the sewerage pipelines were extensively damaged during the disaster, which further made victims avoid restrooms.

Physical damage or strain on healthcare infrastructure (STRAIN): Difficulty of access. Adverse health outcomes associated with hazards can create pressure on health systems (e.g. by increasing the number of hospitalizations) and increase costs for health workers.

Example: In addition, in tsunami-stricken areas, the damage of catheterization laboratories resulted in reduction in percutaneous coronary interventions (PCI) and increase in in-hospital mortality compared to the inland areas.

Physical damage to IT and communication (IT): Disasters can impact data centers and communication towers, leading to equipment failure. They can damage cables and electronic systems through, disrupting critical communication networks and IT operations.

Example: This was primarily due to flooded telecommunication infrastructure in the direct vicinity of flooded houses.

Physical damage to residential buildings (RESI): Disasters cause direct impact to buildings where people live or stay regularly.

Example: Catastrophic flooding associated with the storm displaced >30,000 people to evacuation shelters and flooded >135,000 homes and 1 million cars, making the storm both physically devastating and emotionally traumatizing [37–40].

Physical damage to social infrastructure (PUBL): Disasters cause direct impact to buildings owned by the government or the public, such as city halls, schools, libraries, churches and post offices.

Example: There are several explanations for these observations. First, the damage to the social infrastructure, including health facilities such as cardiac catheterization laboratories, means that patients needing such interventions may have delayed diagnosis and treatment.

Physical damage to energy and gas infrastructure or reduced energy production (ENER): Disasters can destroy power plants and pipelines, damage electrical grids and gas facilities. For example, droughts can reduce water levels for hydropower or nuclear generation, impacting overall energy production.

Example: The power supply collapsed, the entire building technology was destroyed and some 300 patients had to be evacuated by helicopter.

6. Economic losses (ECONOMY)
Economic losses for one or more of the following sectors: industry and commerce, agriculture, forestry, recreation, tourism and culture.

Industry and commerce (INDS): Disasters can halt production, damage inventory and cause natech accidents.

Example: Seven Natechs occurred in Jefferson County around the Port Arthur and Port Neches, where the maximum accumulated rainfall exceeded 1270 mm (50 inches).

Agriculture (AGRC): Disasters can impact agricultural profitability.

Example: First, droughts can generate economic shocks for individuals whose primary income source is agriculture, by affecting agricultural outputs.

Forestry (FRST): Disasters can impact forestry profitability.

Example: First-ever or extremely rare frosts in the Chiquitania and Pantanal regions, between latitudes 16 S and 19 S, contributed to vegetation drying (and dying) in the context of an ecosystem (Chiquitano dry forest) already debilitated by the wildfires of previous years.

Recreation, tourism and culture (RECR): Hazards can damage attractions and recreational facilities. Droughts and heat waves may reduce outdoor activity and visitation. Wildfires can destroy natural landscapes and cultural heritage sites, leading to decreased tourism.

Example: Water supply issues in Monmouthshire and travel to key sporting fixtures in Wales were impacted resulting in further losses which resonate with the increasing socioeconomic impacts resulting from more frequent high magnitude storms caused by climate change.

General economic losses (ECOG): Overall financial impact of an event or disaster on an area or system.

Example: During the winter storms of 2013/14 alone, the UK government estimated England and Wales alone sustained economic losses of £1.3bn.