

EFFECTS OF CLIMATE CHANGE ON WEATHER IN EUROPE AND IN THE WORLD

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Abstract

Extreme weather events can have significant humanitarian (disaster preparedness) impacts, which can also claim human lives, in addition to economic and partially insured damages. Over the past 50 years, the average temperature of the Earth's surface has risen by about 0.7 degrees Celsius, most likely due to increased greenhouse gas emissions. The climate is changing and the Europe region is vulnerable to the consequences. Many of the countries in this region are facing higher temperatures, changing hydrology and other extreme events, droughts, floods, heatwaves, storms and forest fires. This study was conducted by reviewing available published literature, case studies and various information on government organisations, official reports and websites. The scientific research method used was to analyse the evolution of different types of natural disasters in the world, relative trends in extreme natural events causing damage in different parts of the world, and major European floods. From this analysis, we have come to some important conclusions. Weather extremes are the most important factor in the impact of climate change on the cultivation of many crops in European agriculture.

Key words: Europe, weather, climate change

INTRODUCTION

The climate is changing and the Europe region is vulnerable to the consequences. Many of the countries in this region are facing higher temperatures, changing hydrology and other extreme events, droughts, floods, heatwaves, storms and forest fires.

Already the frequency and cost of natural disasters have increased dramatically in this region. And the concentration of greenhouse gases already being released into the atmosphere guarantees that similar or more significant changes will occur in the future, even if the whole world stopped emitting CO² (World Economic Forum, 2013.).

Over the past 50 years, the average temperature of the Earth's surface has risen by about 0.7 degrees Celsius, most likely due to increased greenhouse gas emissions (IPCC, 2013). The associated economic and

social risks, the probability and the multiplier of occurrence are also on an upward trend

As greenhouse gas and particulate emissions associated with human activity continue to rise, so too does the need for action, despite all the uncertainty (IPCC, 2007).

It is not the change in the average values of climatic variables such as temperature, precipitation or wind, or variables derived from these, such as storm surge or surface water run-off, that poses the major risk, but changes in the extreme values of these variables (IPCC/SREX, 2012). Future extremes could become the main drivers of economic and social impacts. Extreme weather could have serious consequences for society (Renn O., 2006).

The popular notion of global warming is often based on a mental picture of a steady and gradual change. However, the expected and possible weather in a given place at a given time can be anything from barely warm to very rapidly increasing (Hov, Øystein et al., 2013).

MATERIAL AND METHOD

This study was conducted by reviewing available published literature, case studies and various information on government organisations, official reports and websites. This study compiles and presents relevant data and information on the effects of climate change on weather in Europe.

The selection criteria for the sources from which we drew were topical, having the most valid and current sources globally so that from each source we could get some important insights.

To produce the paper, in addition to literature sources, we used literature and include books, scholarly papers (IPCC, 2007; IPCC 2013; IPCC/SREX, 2012; NAS and NMI, 2013; Renn O., 2006; World Economic Forum, 2013; Hov, Øystein, 2013) based on which we made our interpretations, as presented below.

The scientific research method used was to analyse the evolution of different types of natural disasters in the world, relative trends in extreme natural events causing damage in different parts of the world, and major European floods. From this analysis, we have come to some important conclusions.

RESULTS AND DISCUSSION

Extreme weather events can have significant humanitarian (disaster preparedness) impacts, which can also claim human lives, in addition to economic and partially insured damages. Data collected by the insurance industry since 1980 provide one indicator of the evolution of extreme events.

Although these are not a direct, stand-alone measure of extreme weather events, nor is it certain that historical records include all events of devastating intensity, they do show that the number of weather-related disasters recorded worldwide increased from an annual average of 335 events between 1980 and 1989 to 545 events in the 1990s and 716 events between 2002 and 2011. Floods and climate-related disasters such as heatwaves, droughts and forest fires show the most significant increase, followed by storms (Fig. 1.).

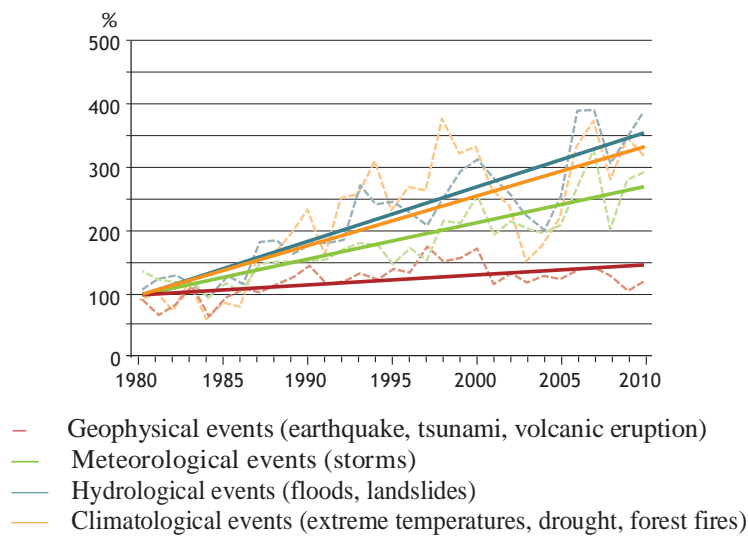


Fig. 1. Evolution of different types of natural disasters in the world, 1980-2012 (1980 represents 100%)

Source: Munich Re NatCatSERVICE)

The analysis makes a clear distinction between all weather-related damage events and geophysical events such as earthquakes, volcanic eruptions and tsunamis, with the latter showing only a very small and statistically insignificant increase.

Compared to other continents, the increase in the number of extreme natural events with damage and losses in Europe is moderate (Fig. 2), but has increased by about 60% over the last three decades.

The largest increases have occurred in North America, Asia and Australia/Oceania, where there are now about 3.5 times as many events as there were in the early 1980s.

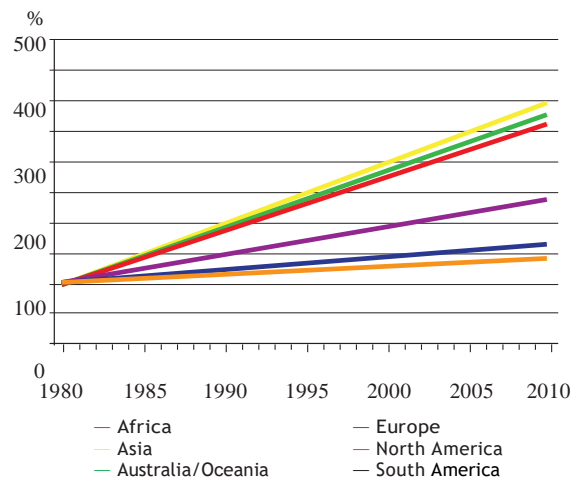


Fig. 2. Relative trends in extreme natural events causing damage in different parts of the world (1980 represents 100%)
Source: Munich Re NatCatSERVICE

Flood damage has also increased dramatically due to several factors, and flooding is an increasingly pressing problem (Fig. 3).

The risk of flooding and the vulnerability of society are increasing due to a range of climate-related and unrelated factors, and are highly dependent on specific local conditions and combinations of these different factors.

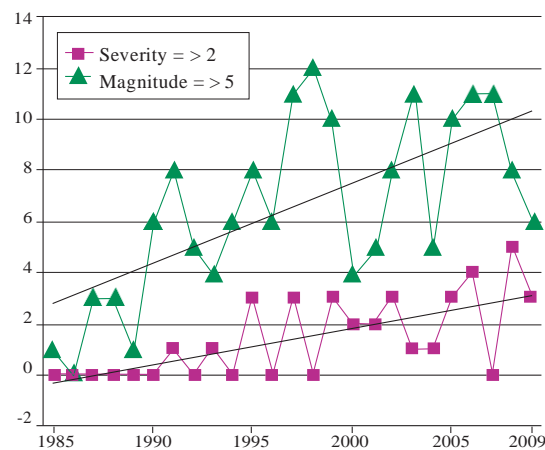


Fig. 3. Major European floods with a severity level of 2 (100 or more recurrences per year) and a magnitude index of 5 or above (a joint index of duration, destructive impact and spatial extent)

Source: (NAS and NMI, 2013)

CONCLUSIONS

Scientific information on the temporal variability, magnitude and extent of the probability of extreme weather events is important for informed societal and political decision-making and leads to appropriate climate change adaptation strategies in Europe.

It is therefore important that such detailed and reliable information continues to be available and is valued in planning and adaptation policy.

More and longer-lasting heat waves and a decrease in the occurrence of extremely cold days and nights are observed. The trend is expected to continue towards more days and more intense heat waves as the temperature continue to warm.

Projections for the future climate show an increased risk of windstorms in western and central Europe.

Weather extremes are the most important factor in the impact of climate change on the cultivation of many crops in European agriculture.

The increasing frequency of extreme weather events is likely to damage cereal production, horticulture and forestry.

Protective measures against these impacts are needed and food and raw material production must be secured for the future.

Adaptation is a critical part of society's response to the threats of global warming and climate change.

Such strategies have already been implemented to increase resilience in certain sectors, such as health and transport.

However, the principle of adaptation needs to be pursued on a much broader sectoral scale, taking into account the latest scientific information on the probability of extreme weather events.

Effective and cost-efficient adaptation will depend heavily on how future global warming will affect the extremes of all-weather phenomena. Further research is therefore needed, in particular in developing regional models to predict possible changes in extreme weather patterns.

Meeting data and information needs requires the establishment of climate observation networks at the European and national levels.

As the impact of heatwave days varies widely across Europe, there is a need for further study of the factors influencing health problems during heatwaves.

In order to improve the resilience of European agriculture, urgent steps should be taken to prepare appropriate plans following the adoption of national or regional adaptation strategies.

Guidance should be provided on vulnerability to extreme weather events and possible measures to increase resilience.

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