

Extreme and devastating weather events and related fatalities in Greece

Michalis Sioutas^{1,2}, Maria Siouta³

¹ National Agricultural Insurance Organization (ELGA), Meteorological Applications Center
Airport Macedonia, Thermi 57001, Thessaloniki, Greece - Email: sioutasm@gmail.com

² Technical Chamber of Greece, Section of Central Macedonia

³ Aristotle University of Thessaloniki, School of Law, 54124 Thessaloniki, Greece
Email: sioutamariaa@gmail.com

Abstract. Extreme or severe weather and climate events occasionally cause devastating impacts to communities, infrastructures, various economic sectors, and natural ecosystems. A disaster related to a weather, climate or water caused every day on average 115 fatalities and 202 million US\$ in the last 50 years (1970-2019) according to the World Meteorological Organization (WMO). In this study, the most devastating and extreme weather events resulted to fatalities in various parts of Greece over the last 53 years (1970-Sep 2023) are investigated. Based on ongoing research, a total of 135 devastating weather events resulted to 287 fatalities have been recorded in the 50-year period. Severe weather events include thunderstorms and floods, lightning, strong winds, tornadoes, snowfalls and freeze. Heatwave and wildfire fatalities are not included in the analysis since no consistent detailed data are available. Climate projection models show the Eastern Mediterranean including Greece as a rapid climate change hotspot area. In this perspective, a consequent increase and intensification of extreme weather events is anticipated thereby increasing human loss, larger damages, economic losses, and destroying impacts to various ecosystems.

Keywords: Extreme Weather; Severe Weather; Weather Fatalities; Climate Change

1 Introduction

Disasters related to weather, climate or water hazards in all over the world caused a daily average of 115 fatalities and US\$ 202 million losses in the 50-year period (1970-2019) according to World Meteorological Organization (WMO). In the same period in Europe, a number of 1672 disasters caused 159,438 deaths and US\$ 476.5 billion damage in economic losses. Floods with 38% and storms with 32% are the prevalent disasters, however heatwaves accounted for the highest number of deaths (93%) with 148,109 lives lost. The two extreme European heatwaves of 2003 and 2010 accounted for the 80% of deaths over the 50-year period 1970-2019 with 127,946 lives lost in both events. Based on data from two different sources (NatCatSERVICE-Munich Re GmbH and CATDAT-RiskLayer GmbH) from the 32 EEA member countries for the period 1980-2020, economic losses amounted to between 450-520 billion (2020 euros) and fatalities to between 85,000 and 145,000 (Figure 1).

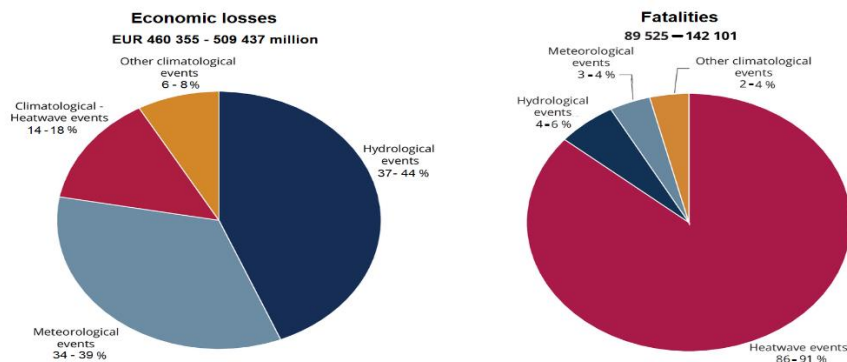


Figure 1. Meteorological and hydrological event related economic losses and fatalities in Europe for 40-year period 1980-2020 (European Environment Agency).

2 Severe weather events and fatalities in Greece

2.1 Greek severe weather database

In Greece, based on ongoing research and a developing database (Sioutas et al., 2022), a total of about 1,050 severe weather events with 135 of those characterized as devastating and killer have been recorded in the last 53-year period (1970-Sep 2023). A total of 287 fatalities occurred by weather floods, windstorms, lightning and cold-frost conditions. In Table 1 a sample of the most severe weather events and related fatalities is presented.

Table 1. Devasting weather events and associated fatalities in Greece in the last 53 years (1970-Sep 2023).

No	Date	Place	Event	Number of fatalities
1	21 July 1983	Thermaikos Gulf, Thessaloniki	Windstorm	9
2	23 August 1990	Northern Euboea	Flood and Lightning	7
3	21 November 1994	Attica	Flood	6
4	26 May 2007	Lousios River, Arcadia	Flood	6
5	25 March 2009	Manolada, Iliia	Tornado	3
6	22 November 2013	Rhodes Isl.	Flood	4
7	15 November 2017	Mandra, Attika	Flood	23
8	10 July 2019	Chalkidiki	Windstorm	7
9	5 December 2019	Evros	Cold - Frost	6
10	5-7 September 2023	Thessaly	Flood	15

2.2 Temporal distribution of severe weather-related fatalities

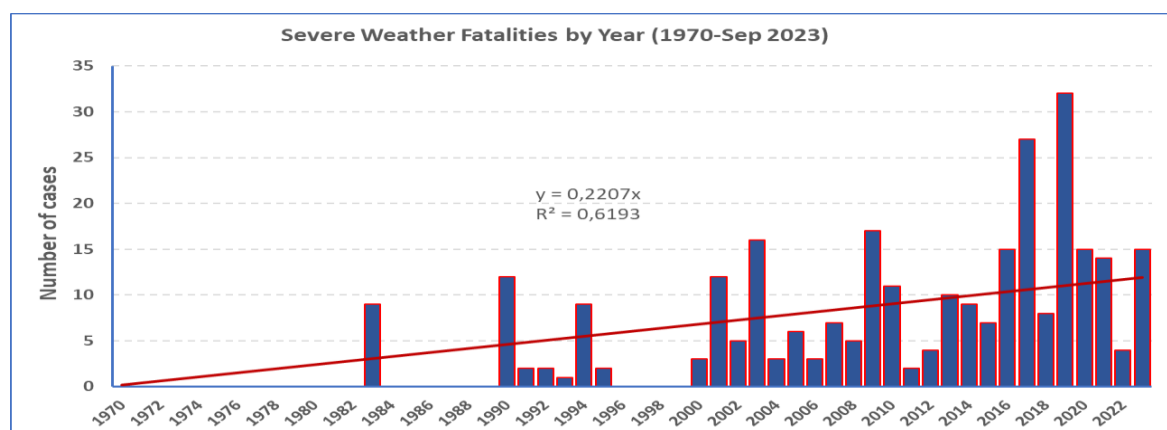


Figure 2. Yearly distribution of severe weather event fatalities in Greece for the 53-year period (1970-Sep 2023).

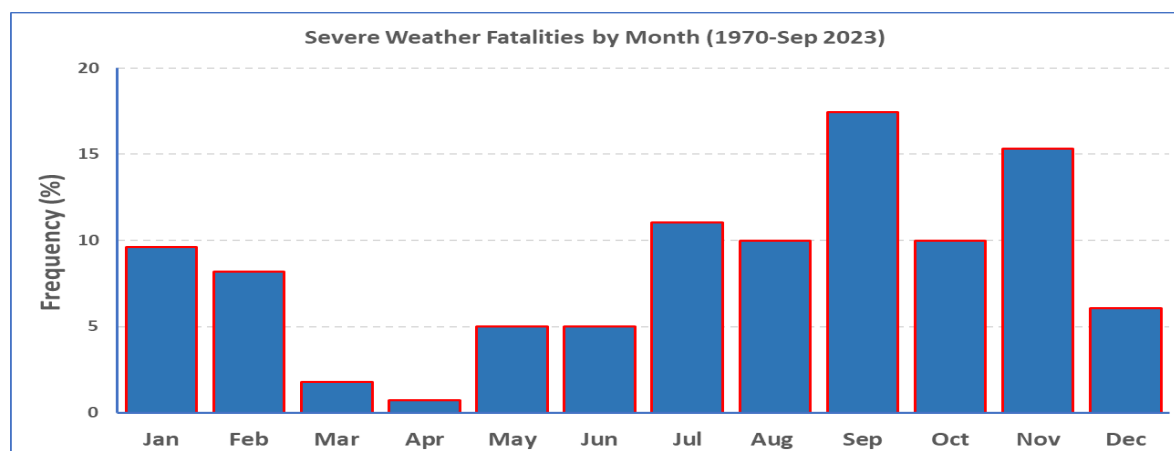


Figure 3. Monthly frequency of severe weather event fatalities in Greece for the 53-year period (1970-Sep 2023).

3 Summary and Conclusions

Weather and climate related fatalities are examined based on a severe weather database for Greece for the last 53 years (1970-Sep 2023). In this study the fatalities caused by the most devastating and extreme weather events in Greece over the last 53 years (1970-Sep 2023) are investigated. Severe weather events include thunderstorms and floods, lightning, strong winds, tornadoes, snowfalls and freeze. Based on ongoing developing database, a total of 135 devastating weather events resulted to 287 fatalities have been recorded in the 50-year period.

References

European Environment Agency (2021), “Economic losses and fatalities from weather and climate related events in Europe”. HTML - TH-AM-21-018-EN-Q - ISBN: 978-92-9480-419-8 - ISSN: 2467-3196 - doi: 10.2800/7654

Sioutas M., Lekidis V. and Kokolakis C. (2022), “Extreme and severe weather events in Thessaloni” Proceedings 9th International Conference on Civil Protection and New Technologies, 29 Sep-1 Oct, Thessaloniki p. 81-84. SafeThessaloniki 2022 ISSN 2654-1823.

IPCC (2022), “Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change” [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.