



**STARS 4 Water**

## **Impact Reporter**

**Report for “Destructive flood event in Thessaly, Greece,  
September 2023”**

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| <b>Title</b>           | Destructive flood event in Thessaly, Greece, September 2023                        |
| <b>Image</b>           |  |
| <b>Reference point</b> | 39.54928676339433,22.210056142725527                                               |

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| <b>Countries</b>                          | Greece                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>NUTS</b>                               | Thessalia (EL61)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>RBD</b>                                | Greece - THESSALIA (EL08)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Event Type</b>                         | Flood                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Start Date</b>                         | 4 Sep 2023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Duration (hours)</b>                   | 96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Event extent (km<sup>2</sup>)</b>      | 1300.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Event severity</b>                     | HIGH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Return period of the event (years)</b> | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Sources</b>                            | <a href="https://earthobservatory.nasa.gov/images/151816/greece-agricultural-heartland-underwater">https://earthobservatory.nasa.gov/images/151816/greece-agricultural-heartland-underwater</a><br><a href="https://earthobservatory.nasa.gov/images/151807/a-deluge-in-greece">https://earthobservatory.nasa.gov/images/151807/a-deluge-in-greece</a><br><a href="https://emergency.copernicus.eu/mapping/list-of-components/EMSN184">https://emergency.copernicus.eu/mapping/list-of-components/EMSN184</a>                                                                                                                                                                                                                  |
| <b>Contact Persons</b>                    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Event Description</b>                  | <p>In September 2023, the Thessaly region of Greece experienced catastrophic flooding after the storm "Daniel" brought unprecedented rainfall. Over several days, torrential rains inundated towns and villages, leading to severe flooding across an area of approximately 1,300 square kilometers. The floods claimed at least 17 lives, displaced thousands, and caused extensive damage to homes, infrastructure, agriculture, and livestock. The region, a key agricultural hub, faced billions of euros in losses, with contaminated water supplies and damaged roads further complicating recovery efforts. The disaster highlighted the vulnerability of infrastructure and communities to extreme weather events.</p> |
| <b>Event Severity Assessment Method</b>   | <p>This was one of the worst flood events in Greek history, classified as a catastrophic event with 17 fatalities. The severity was assessed through satellite imagery (e.g., Copernicus EMS), rainfall data, and field damage reports.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

Rainfall peaked at 900 mm in parts of the region over 48 hours, leading to overwhelming floods.

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| <b>Impact Significance</b>                                         | HIGH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |
| <b>Impacted Sectors</b>                                            | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Residential and Commercial                 |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Agriculture                                |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Livestock                                  |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Tourism & Recreation                       |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Industry                                   |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Energy                                     |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Infrastructure (roads, water supply, etc.) |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Public Health                              |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Forestry                                   |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Plants & Wildlife                          |
|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Mining and Quarrying                       |
|                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Transportation and Navigation              |
| <b>Impact Types</b>                                                | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Environmental                              |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Societal and Cultural                      |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Economic                                   |
|                                                                    | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Health                                     |
| <b>Impact Type – Impact Subtype – Severity – Indicator – Value</b> | <b>ENVIRONMENTAL</b><br><br><b>Subtype: Reduced surface water availability</b><br><br>Severity: Medium<br><br><b>Indicators:</b><br><br><ul style="list-style-type: none"> <li>• <b>Reduction in reservoir levels (cm):</b> 20.0</li> </ul> <b>Subtype: Water quality deterioration (eutrophication, turbidity, contamination, pollutants, heavy metals, increased toxicity, etc.)</b><br><br>Severity: High<br><br><b>Indicators:</b><br><br><ul style="list-style-type: none"> <li>• <b>Increased contamination/pollutants levels in water sources (mg/L increase):</b> N/A</li> <li>• <b>Nutrient loading (kg/km<sup>2</sup>):</b> N/A</li> <li>• <b>Volume of debris generated (tonnes):</b> 400000.0</li> <li>• <b>Changes in turbidity (Nephelometric Turbidity Units – NTU increase):</b> 25.0</li> </ul> <b>Subtype: Biodiversity and Habitat loss and/or degradation (reduction and degradation of fish and</b> |                                            |

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|  | <p><b>wildlife habitat, damage to animal species, damage to plant species, etc.)</b></p> <p>Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Number of species affected, lost or displaced (number): 200.0</b></li> <li>• <b>Loss of habitat (km<sup>2</sup>): 15.0</b></li> <li>• <b>Wetland loss or alteration (km<sup>2</sup>): N/A</b></li> <li>• <b>Forest and/or vegetation cover loss (km<sup>2</sup>): 50.0</b></li> <li>• <b>Aquatic species or fish mortality (tonnes): 25.0</b></li> </ul> <p><b>Subtype: Land and Soil degradation, including landslides</b></p> <p>Severity: Very High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Inundated area (km<sup>2</sup>): 7000.0</b></li> <li>• <b>Area of farmland rendered unusable (km<sup>2</sup>): 850.0</b></li> <li>• <b>Sediment deposition in floodplains (cm): 15.0</b></li> </ul> |
|  | <p><b>SOCIETAL AND CULTURAL</b></p> <p><b>Subtype: Displacement and Housing</b></p> <p>Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Number of people displaced (number): 10000.0</b></li> <li>• <b>Number of houses damaged or destroyed (number): 90.0</b></li> </ul> <p><b>Subtype: Disruption in community services and education</b></p> <p>Severity: Medium</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Number of community services disrupted (e.g., water, electricity) (number): N/A</b></li> <li>• <b>Duration of transportation disruption (days): 30.0</b></li> <li>• <b>Number of health care facilities damaged or destroyed (number): N/A</b></li> <li>• <b>Length of roads and bridges damaged (km): 180.0</b></li> </ul>                                                                                                        |

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|  | <p><b>Subtype: Disruptions and/or shortages in water supply</b><br/>Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Population without access to clean water after the event</b> (number of people): 250000.0</li> <li>• <b>Duration of water supply disruption</b> (days): 15.0</li> </ul> <p><b>Subtype: Water-related conflicts (between e.g. public authorities, sectoral stakeholders, water users)</b><br/>Severity: Medium</p> <p><b>Subtype: Damage to landscapes and recreational areas</b><br/>Severity: Medium</p> <p><b>Subtype: Loss of Cultural or Spiritual heritage</b><br/>Severity: Medium</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Number of cultural heritage sites damaged</b> (number): N/A</li> <li>• <b>Number of disrupted cultural events</b> (number): 20.0</li> </ul> <p><b>Subtype: Impacted population</b><br/>Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Number of people impacted</b> (number): 150000.0</li> </ul> |
|  | <p><b>ECONOMIC</b></p> <p><b>Subtype: Residential property damages (households)</b><br/>Severity: Very High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Total monetary value of residential (households) property damage</b> (euros): 2000000000.0</li> </ul> <p><b>Subtype: Commercial and industrial properties damages</b><br/>Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Total monetary value of commercial and industrial properties damage</b> (euros): N/A</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

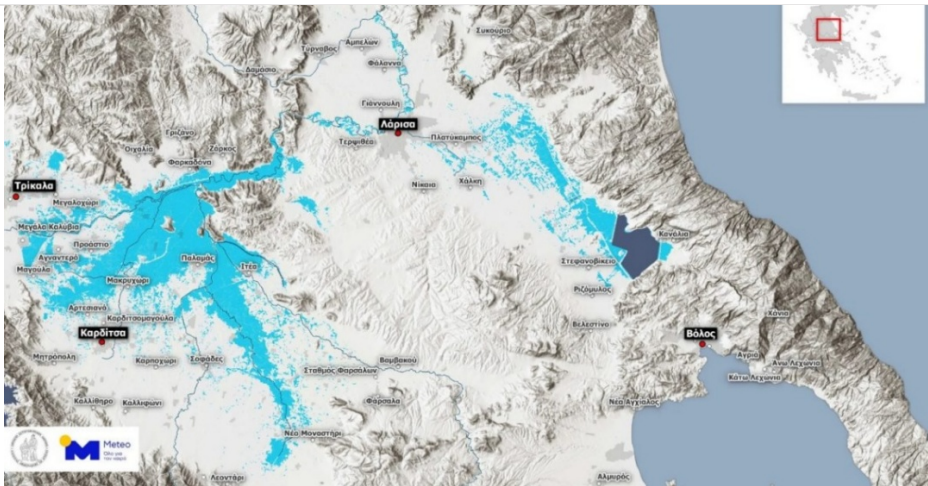
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|  | <p><b>Subtype: Public/ Community buildings and infrastructure damage</b><br/>Severity: Very High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Total monetary value of damages in roads and bridges (euros):</b> 500000000.0</li> </ul> <p><b>Subtype: Direct Agricultural and Livestock losses</b><br/>Severity: Very High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Crop yield losses (tonnes):</b> N/A</li> <li>• <b>Monetary value of crop yield losses (euros):</b> 1500000000.0</li> <li>• <b>Livestock losses (number of animals):</b> 112000.0</li> <li>• <b>Monetary value of livestock losses (euros):</b> 300000000.0</li> <li>• <b>Agricultural area affected (km<sup>2</sup>):</b> 1100.0</li> </ul> <p><b>Subtype: Lost income in Agriculture</b><br/>Severity: Very High</p> <p><b>Subtype: Lost income in Industries</b><br/>Severity: Medium</p> <p><b>Subtype: Lost revenue in Tourism</b><br/>Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Lost revenue in tourism (euros):</b> 30000000.0</li> </ul> <p><b>Subtype: Public spending for emergency response and mitigation</b><br/>Severity: Very High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li>• <b>Government expenditure on emergency response (euros):</b> 600000000.0</li> <li>• <b>Government expenditure on mitigation measures (euros):</b> N/A</li> <li>• <b>Subsidies or financial aid provided for households (euros):</b> 80000000.0</li> </ul> <p><b>Subtype: Economic damage</b><br/>Severity: Very High</p> <p><b>Indicators:</b></p> |
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|                                  | <ul style="list-style-type: none"> <li><b>Total economic damage across sectors (euros):</b> 3500000000.0</li> </ul> <p><b>HEALTH</b><br/> <b>Subtype: Fatalities and injuries caused</b><br/> Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li><b>Number of fatalities caused by the event</b> (number of deaths): 17.0</li> <li><b>Number of injured people</b> (number): N/A</li> </ul> <p><b>Subtype: Incidence of waterborne diseases (e.g., cholera, typhoid, dysentery)</b><br/> Severity: Medium</p> <p><b>Subtype: Impacts on mental health</b><br/> Severity: Very High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li><b>Number of individuals reporting related psychological distress</b> (number): 20000.0</li> </ul> <p><b>Subtype: Respiratory and/or heat-related health Impacts</b><br/> Severity: Medium</p> <p><b>Subtype: Access to healthcare</b><br/> Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li><b>Increase in hospital admissions</b> (number of admissions): 800.0</li> <li><b>Population unable to access healthcare (%)</b>: 30.0</li> </ul> <p><b>Subtype: Health issues due to contaminated water</b><br/> Severity: High</p> <p><b>Indicators:</b></p> <ul style="list-style-type: none"> <li><b>Number of cases with health issues due to contaminated water (e.g. gastrointestinal issues)</b> (number): 500.0</li> </ul> |
| <b>Impact Assessment Methods</b> | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Uncertainty Evaluation</b>    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

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| <b>Emergency Response Measures</b> | The Greek government allocated €600 million for emergency response and immediate relief. The Greek military and emergency services conducted widespread evacuations and |
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|                                      | relief operations, rescuing over 5,000 residents from flooded areas.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Mitigation Measures</b>           | <p>Financial assistance: Immediate financial assistance has been provided. By April 2024, the Ministry of Climate Crisis and Civil Protection had disbursed approximately €173.8 million to 48,841 households, businesses, agricultural enterprises, and livestock units affected by the floods (of which €80 million distributed to flood-affected households for property repairs). In September 2024, Prime Minister announced a substantial allocation exceeding €3 billion for the recovery of Thessaly. This funding encompasses support for agricultural restoration, infrastructure rebuilding, and flood protection projects.</p> <p>Infrastructure rehabilitation and Flood defense projects: Repairs and reinforcement of damaged infrastructure, including roads, bridges, and flood defenses, to restore functionality and prevent further damage. In September 2024, four new anti-flooding projects commenced across the four prefectures of Thessaly—Karditsa, Trikala, Larissa, and Magnesia—at a total cost of €75 million. These projects aim to strengthen existing flood defenses and improve water management systems</p> |
| <b>Long Term Adaptation Measures</b> | <p>There are plans to invest in nature-based solutions, such as restoring wetlands and widening riverbeds to enhance flood resilience. The city of Trikala has committed €7 million to such initiatives, with a focus on restoring damaged rivers and wetlands to absorb future floodwaters</p> <p>Master Plan Development: A master plan with interventions for restoration and anti-flooding measures, as well as solutions for sustainable irrigation in agricultural and livestock production.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

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| <b>Data Managers</b>  | Maggie Kossida (SEVEN), Anthi Manali (SEVEN)                                                                 |
| <b>Related events</b> | -                                                                                                            |
| <b>Event Files</b>    |  <p>Map of the event</p> |