



# Public Health and Climate Change resilience Drinking Water quality monitoring in cases of natural disasters

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# Circulars for the mitigation of natural disasters impact



- The Hellenic Ministry of Health has issued a series of Circulars for the mitigation of effects from natural disasters (fires, earthquakes, floods etc.), with the aim of:
- protecting the health of the population of the affected areas,
- preventing impacts on Public Health from unpredictable intensity of extreme weather events



# Earthquakes (Athens, 1999)



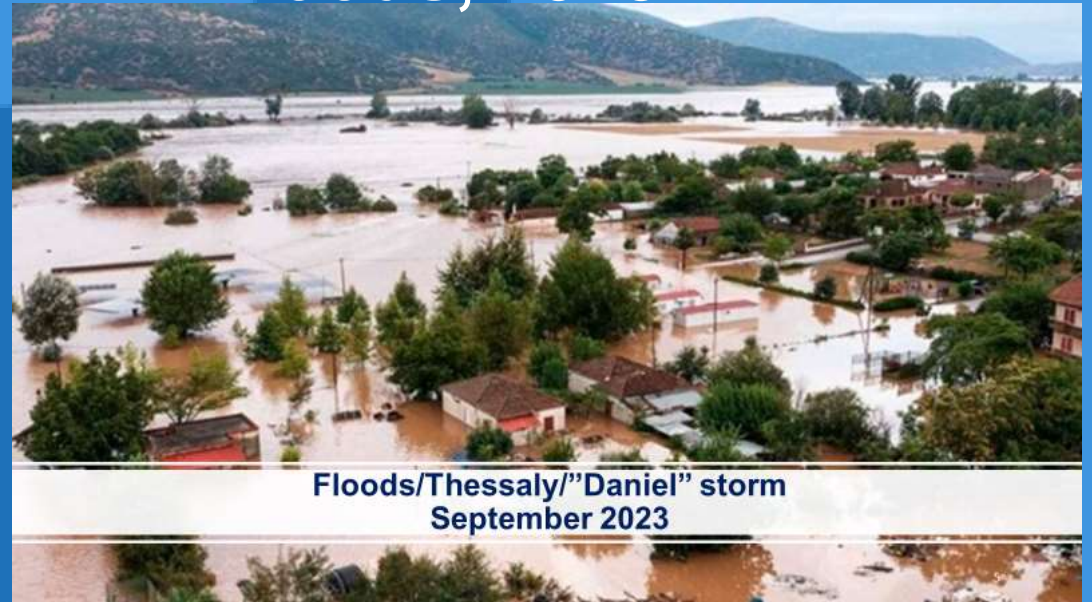
# Floods (Mandra, Attica, 2017)



# Fires, 2021, 2023



# Floods, 2023

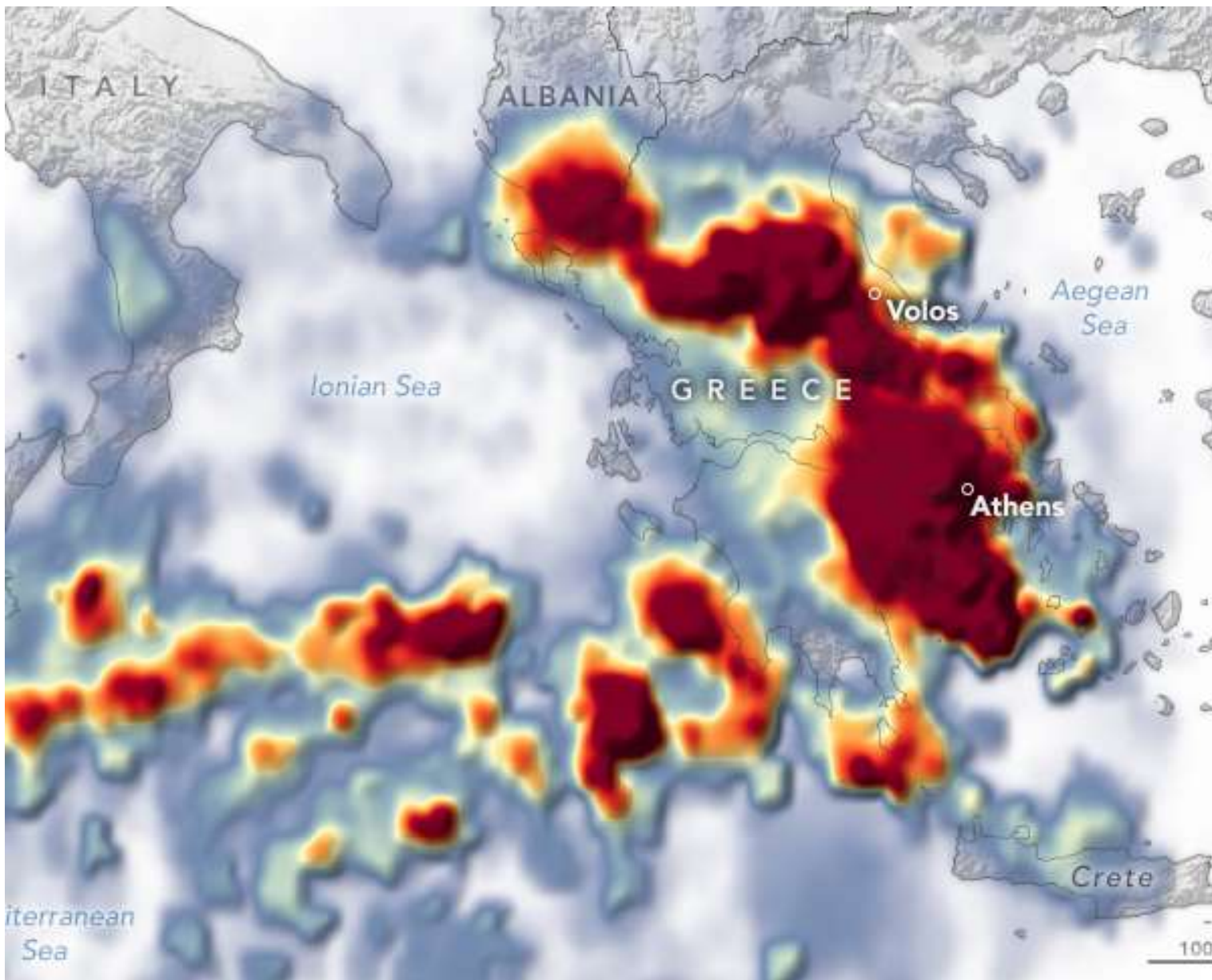


Floods/Thessaly/"Daniel" storm  
September 2023

## Satellite data from the European Space Agency's Sentinel-1 satellite:

Rainfall heights during the storm "Daniel" (Sept. 2023)

- On 5.9.23 the village of Zagora received **1092mm of rain, 55 times more than the country's average** rainfall for the same month.



Precipitation Rate (mm/hr)



## Statistical data

The EU's Copernicus Emergency Management System reported

- nearly **730,000 hectares of land flooded** in Thessaly.

- about **4,500 people evacuated** from affected areas either being airlifted or by lifeboats

- **17 people confirmed dead**, while several thousands remained trapped inside buildings or in remote areas for an extended period of time.



- more than **65,000 dead animals** collected and part of them cremated,
- while **210,257 animal losses** reported up to 14.09.2023.



## Epidemiological data



From the beginning of the disasters until 25.9.2023, occurred more than:

- **200 cases of gastroenteritis**, with the main pathogens being salmonella, e-Coli, rotavirus and clostridia,
- **150 cases of upper respiratory tract infections** with a significant number of new Covid-19 cases among elderly homeless people living in temporary accommodation
- a total of **34 cases of leptospirosis** laboratory confirmed so far, 6 of which were hospitalized. **61 incidents were under investigation.**

# Epidemiological situation/ Impacts on public health



- According to the National Public Health Organization from the beginning of period 2023 until 19/09/2023, **(131) domestic cases of West Nile** virus infection have been diagnosed and investigated in Greece.
- The vigilance of health professionals in cases of dealing with **wound infection** by bacteria, such as staphylococcus and streptococcus and fungal infections, is deemed appropriate.
- In addition, it is very probable that **bites from wild or even domestic animals and reptiles** may occur.

# Measures to be taken to ensure Public Health in cases of natural disasters



## A. In every case

**Compliance with legal requirements:  
New European DW Directive  
2020/2184**

## B. In case of severe weather events and natural disasters

**Immediate sanitary control of the functioning of the water supply and sewage systems.**

**Leak investigation  
Actions according to severity**

## C. In special cases

**Provision for dealing with new conditions**



# Quality of water for human consumption

## Mechanical damage to water supply networks



During natural disasters there is a high possibility of observing

mechanical damage to the water supply network and

intrusion of foreign materials into it (e.g. suspended particles, soil, mud, etc.),

The above may deteriorate the quality of water for human consumption



For this reason, we should carry out immediately:



a sanitary investigation of the water supply system:

Water source, reservoirs, facilities, network, etc. as well as

laboratory control (microbiological and physicochemical parameters) after appropriate sampling.

Water samples should be taken from critical points of the water supply network, such as

- boreholes or water sources,
- water supply tanks, and
- in various parts of the network, but mainly upstream and downstream of a failure area in the supply pipe.

Meanwhile, if there is a lack of **safe drinking water**, it may be necessary to advise consumers to

- **boil** water during the emergency for hygiene purposes mainly and
- use **bottled water** for human consumption.

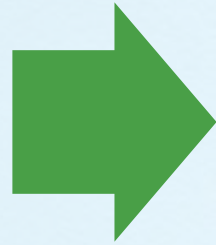
After identifying the problem and

dealing with it by

- repairing the network damage
- taking measures to protect the source



if the  
problem is  
generalized,



We apply the measure of **water  
superchlorination**

in the **water supply tank** and along the  
whole length of the water supply system  
with a **highly concentrated chlorine  
solution** and a **corresponding retention  
time.**

**The water** will be discarded afterwards and  
then the re-operation of the network will  
begin.

- The sampling and laboratory control of the water at critical points of the water supply network should be systematic, including
- the values of **residual chlorine (which should be increased to higher than 0,5mg/l)** and
- **increase in the monitoring frequency** of specific quality parameters of the water intended for human consumption



# Drinking Water



As a result of the different issues outlined above, **risks** associated with **drinking water safety** will be aggravated due to climate change in future.

However, the **relationship** between **climate change** and drinking water safety is complex, and **many factors play an important role** in its determination, such as:

- **the specific water treatment technology,**
- **the distribution system,**
- **public awareness,**
- **the frequency of extreme events,**



# Conclusion



To deal with the consequences of the **climate change** and its impact

**on drinking water**, it is necessary to develop:

- local contingency plans for ensuring the safety of reserve sources of drinking-water
- national and local plans of action for water disinfection during an emergency

Additional **measures** such as the construction of **anti-flood works**, the more **efficient use of scarce water resources**, the development of **drought-resistant crops**, etc. should also be taken under consideration.

*Thank you for  
your attention !*

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