
Climate Change and Water Resources in Europe

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1. RIVER WATER LEVEL CRISIS IN EUROPE

Europe is warming faster than other continents, and its rivers are drying up

- Due to climate change, Europe is warming **considerably faster** than other continents, leading to extremely low river levels
- WMO (2025): the global water cycle is changing **faster than water management systems can adapt**
- World Weather Attribution: Europe's drought was caused by two linked factors: **lack of rainfall** and **extreme temperatures**
- Drought is raising economic and energy costs: due to extremely low water levels on the **Rhine**, vital to Germany's economy and industry, cargo ships in 2026 had to reduce their loads to avoid running aground

2025

one of the driest years
for global river flows in
the past 35 years

Drought is already hitting the economy and energy sector, and costs are rising

50–180

€bn

expert estimate of what drought could cost Europe, including all effects of extreme heat

- Severe droughts (e.g. 2022) caused **record-low water levels** on the Danube and Rhine, limiting the water available for drinking and for cooling power plants
- Water shortages hit the economy, industry and energy: nuclear power plants in **France, Hungary and Romania** had to cut output or shut down because they could not cool their reactors
- Over the past decade, droughts have become **more frequent and severe**, and projections show this will worsen

2. IMPACT OF CLIMATE CHANGE ON WATER

A warmer climate means more droughts, but also heavier rain and floods

- Climate change has a marked impact on Europe's water resources, and therefore on **drinking water security**
- The hydrological cycle is becoming more extreme: **more intense and frequent droughts**, but also episodes of heavy rainfall and flooding
- Prolonged drought **lowers groundwater levels** and concentrates pollution; heavy rains wash pollutants into waterways or overload sewer systems
- Water supply is most at risk during dry periods; **southern Europe** suffers from chronic water shortages

about 30%

of southern Europe's population lives under permanent water stress

up to 70%

of southern Europe's population lives under seasonal summer water stress

2. IMPACT OF CLIMATE CHANGE ON WATER

Without further action, water scarcity will not ease by 2030

- The EEA warns that climate change will amplify seasonal fluctuations in water availability; dry periods **will become increasingly intense**, and precipitation more uneven
- Stronger storms and floods can **contaminate wells and surface water sources** (silt, chemicals, sewage) and damage pipelines and treatment plants
- Heat waves increase **water loss through evaporation** and water consumption

40–60%

increase in the duration
of heat extremes across
the Balkans,
2003–2023

2. IMPACT OF CLIMATE CHANGE ON WATER

Climate change affects European regions differently

- **Mediterranean:** more extreme temperatures, less rain and a higher risk of drought and wildfires
- **Atlantic and boreal regions:** more heavy rain and higher river flows
- **Continental region:** less summer rain, higher risk of river flooding

Source: European Environment Agency

KAKO KLIMATSKE PROMJENE UTJEČU NA EUROPU

Arktik

- ⬆️ Porast temperature iznad globalnog prosjeka
Manje leda nad Arktičkim morem
Manje leda nad Grenlandom
Manje permafrosta
Veći rizik od gubitka bioraznolikosti
- ⬆️ Nove prilike za iskorištavanje prirodnih izvora energije i prijevoz morem
- ⬇️ Rizik za život lokalnog stanovništva

Borealna regija

- ⬆️ Više jake kiše
Manje snijega i leda
Više kiše i jači protok rijeka
Šume rastu brže s većim rizikom od nametnika
Zimske oluje uzrokuju veće štete
- ⬆️ Više prinosa od usjeva
Manja potrošnja energije za grijanje
Više prilika za korištenje hidroenergije
Više ljetnog turizma

Planinska područja

- ⬆️ Temperature rastu iznad europskog prosjeka
Gledača je sve manje i sve su manji po veličini
Biljke i životinje sele se u viša područja
Veći rizik od izumiranja vrsta
Veći rizik od šumskih nametnika
Veći rizik od klizišta i odrona kamenja
Posljedice za hidroelektrane
- ⬇️ Manje zimskog turizma

Mediterran

- ⬆️ Više ekstremnih temperatura
Manje kiše i slabiji protok rijeka
Veći rizik od suša
Veći rizik od gubitka biološke raznolikosti
Veći rizik od šumskih požara
- ⬇️ Veća konkurencija za opskrbu vodom
Više vode potrebno za poljoprivredu
Manje prinosa od usjeva
Stočarstvo je sve teže
Proizvodnja energije je sve teža
Veća potrošnja energije za hlađenje
Manje turizma ljeti, mogući rast izvan sezone
Negativni utjecaj na većinu gospodarskih sektora
Ranjivost zbog posljedica klimatskih promjena izvan Europe
- ⬇️ Više ljudi umire od toplotnih udara
Širenje područja na kojima su ljudi podložni zarazama zbog insekata

Atlantska regija

- ⬆️ Više jake kiše
Veći protok rijeka
Veći rizik od poplava
Veći rizik od šteta zbog zimskih oluja
Više loših vremenskih uvjeta
- ⬇️ Manja potrošnja energije za grijanje

Kontinentalna regija

- ⬆️ Više ekstremnih vremenskih uvjeta
Manje kiše ljeti
Veći rizik od riječnih poplava
Veći rizik od šumskih požara
- ⬇️ Šume gube na vrijednosti
Veća potrošnja energije za hlađenje

Priobalna područja i mora

- ⬆️ Viša razina mora
Više temperature površine mora
Rast kiselosti oceana
Morske vrste migriraju prema sjeveru
Promjene u zajednicama fitoplanktona
Više mrtvih područja u morima
- ⬇️ Rizici i prilike za ribarstvo
- ⬇️ Sve veći rizik od bolesti iz voda

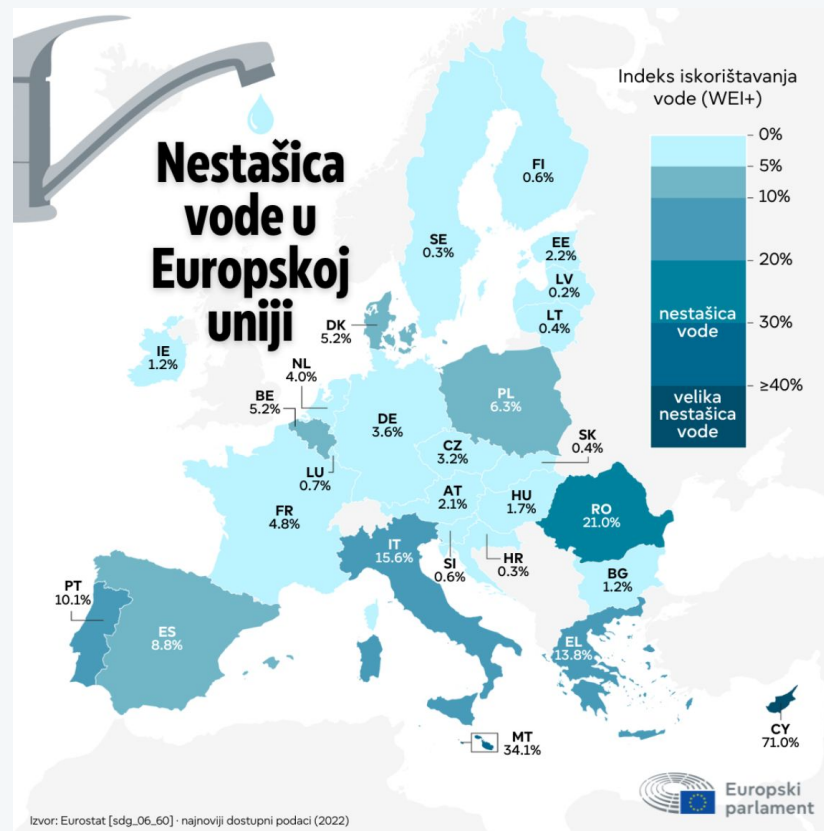


2. IMPACT OF CLIMATE CHANGE ON WATER

Water Exploitation Index (WEI+)

WEI+ expresses water consumption as a percentage of renewable freshwater resources in a given territory over a given period.

The map below shows that **Cyprus** was the member state with the greatest water availability problems in 2022, followed by **Malta** and **Romania**.



Cyprus and Malta are hit hardest by water scarcity

71%

Cyprus
of renewable freshwater
per year; up to 92% in
summer

34%

Malta
of renewable freshwater
per year; 67% in summer

1 in 10

EU residents
have difficulty accessing
safe, clean water

- Cyprus is effectively in a state of **permanent water crisis**
- Romania, Greece, Italy, Portugal and Spain **also record elevated values**
- Access to water is most difficult in **Cyprus (36.5% of residents)** and **Greece (31.5%)**
- Every year, water scarcity affects about **20% of European territory** and **30% of the population**

3. WATER POLLUTION: MAIN THREATS AND HOW TO PREVENT THEM

The problem is not only the quantity of water, but also its quality

37%

of European surface waters
in “good” or “high” status

29%

of surface waters in “good”
chemical status

Main water pollutants

Industrial chemicals

heavy metals and persistent pollutants known as
“forever chemicals”

Agricultural chemicals

reach rivers, lakes and other waters

Microplastics

one of the largest water pollutants globally

3. WATER POLLUTION: MAIN THREATS AND HOW TO PREVENT THEM

PFAS – “forever chemicals” that barely break down in nature

What are PFAS?

Per- and polyfluoroalkyl substances: a group of **thousands of synthetic chemicals**, in widespread use since the 1940s

Why are they so resistant?

The extremely strong bond between **carbon and fluorine** makes them resistant to heat, water, grease and stains

Where are they found?

Non-stick cookware, waterproof clothing and footwear, stain-resistant carpets

Why “forever”?

In nature they **do not break down**, or break down extremely slowly, over decades

4. PREVENTIVE MEASURES TO PROTECT WATER RESOURCES IN EUROPE

By 2030, global water demand will exceed available resources by 40%

Measures for water availability and quality

- 1 Restoring and protecting the water cycle from source to sea
- 2 Smart water management and green infrastructure
- 3 A water-smart economy
- 4 Access to clean, affordable water for all: education on saving water, international cooperation and partnerships

EEA recommendations

- By 2030, **halve** nutrient losses and pesticide use
- **Nature-based solutions** against flooding: removing dams and channels, restoring wetlands and peatlands

40%

of global patents in water technologies

€107bn

revenue of the European water industry

1.7 million

people employed in the water industry

Conclusion

Heat waves and droughts are projected to become more frequent and intense across most of Europe by mid-century.

Cooperation

Cross-border cooperation, shared water resources, and regional and transnational solidarity among member states

Investment

Water infrastructure and smart systems for real-time monitoring of water quality and consumption; smart water management and technologies for a sustainable future

Governance

The response is above all a matter of governance: continuous and comparable monitoring, protection of water sources and groundwater, less pressure on surface waters, preservation of aquatic and water-dependent ecosystems, and water risks built into spatial planning, agriculture, energy and infrastructure

Thank you for your attention!

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