European Commission

SCIENCE BEHIND THE DEBATE

The River Oder Disaster
Key lessons to learn

HIGHLIGHTS

→ During August 2022, massive fish kills occurred on the Oder river and eventually resulted in the death of approximately 360 tonnes of fish in Poland and Germany.

→ Their deaths were caused by a substantial toxic algal bloom. The causal species was identified as *Prymnesium parvum*, a species adapted to brackish salinities.

→ Key root causal factors were the high salinity of the Oder but also low water levels, reduced flow and high nutrient concentrations. Modifications to the hydromorphology (the physical character and water content of the river) also played a role.

'Virginijus Sinkevičius European Commissioner for the Environment comments on the disaster and JRC report: "We can never allow something similar to ever happen again. I invite national authorities to fully implement the report's recommendations and EU legislation."

KEY EVENTS AND CAUSES

What happened in the Oder River?

The summer of 2022 was a wake-up call for many. Among the many worrying pictures of severe drought impact across Europe, citizens were also confronted with the shocking images of hundreds of thousands of fish that died in the river Oder, within the space of just a few weeks in July and August. This was one of the largest ecological disasters in recent European river history, the damage spreading for hundreds of kilometres.

What caused the disaster?

The direct cause of the ecological disaster in the Oder River was prymnesin toxins from the *Prymnesium parvum* algae. This species is capable of producing strong toxins lethal to fish. As it is an estuarine species adapted to higher salinities, the elevated discharges of polluting salts in the Oder catchment were key to providing conditions for the disaster to happen. Salt discharges have been a longstanding issue from mines and other sources in the Oder catchment. Other factors that favoured algal bloom development included: the warm temperatures coupled with high sunlight and low cloud cover resulting from heatwaves aggravated by global warming. The low water levels and hydromorphological modifications leading to slower flow also contributed by allowing time for bloom formation. Another key factor was the ample supply of nutrients such as phosphorus and nitrogen from diffuse agricultural emissions, allowing rapid growth of algae. The causes of the disaster were therefore multifactorial, and all directly or indirectly of anthropogenic in nature.

What can be done to prevent future disasters?

In order to prevent a reoccurrence, a series of recommendations were made by the Polish and German authorities, compiled and expanded by a *recent joint report* by the European Commission, European Environment Agency and the JRC. The key recommendations were:

● Improve response and risk management (anticipate responses and prepare resources).

● Review and verify existing permits conditions and incl. an obligation to suspend discharges in case of emergencies.

● Increase enforcement action on illegal pollution discharges.

● Set emission limit values for pollutants emissions in water, taking account of the water levels and flows in the rivers.

● List all industrial discharges in a complete and up to date public inventory of emissions : European Industrial Emissions Portal (*europa.eu*).

● Improve continuous water quality monitoring.

● Improve environmental management (evaluation of hydromorphological changes, introduction of thresholds for salinity /nutrient in freshwater).

● Improve proactive communication to stakeholders, public and countries likely to be affected.

● Further investigate the source of the incident (while a multifactorial event, sources of discharges of saline material should be identified and checked against permits, compared to long-term salinity levels).

● Start restoration (inventory of damage, develop plan for restoration of the river).

● Promote research aimed at preventing future toxic blooms and salinisation.

A preliminary risk assessment was carried out that identified rivers and groundwaters with high salinity, non-marine sulphate (such as from mines) and high nutrients. Using available data about 4% of rivers met these risk criteria indicating that many EU countries should redouble their efforts towards environmental protection in this area (Fig. 1).

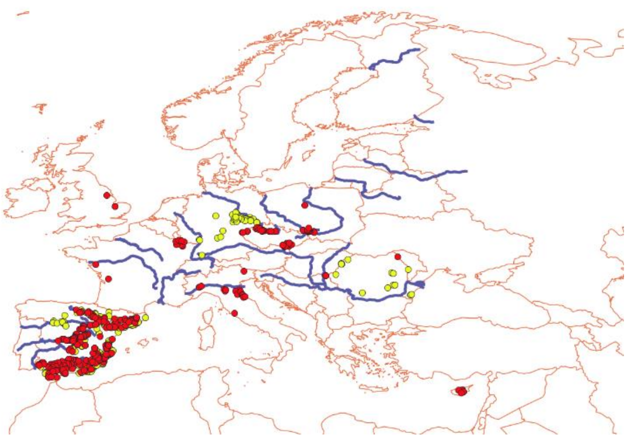

Figure 1 – EU waters are threatened by high nutrients and salinity.

Box 1: Better implementation of existing EU policies needed.

The entire length of the Oder River was classified as poor for the years preceding the incident based on biological and chemical condition. When rivers have already lowered resilience they become vulnerable to further pressure. In this case, the period of drought and heatwaves may have concentrated and reduced the dilution of polluting salts, providing an ideal habitat for *Prymnesium parvum* which subsequently travelled downstream with drastic consequences.

The Water Framework Directive (WFD) and the Industrial Emissions Directive (IED) are two of the main European instruments to address water quality and the efficiency and emissions from industrial installations. The WFD already provides a policy avenue in place to anticipate and manage pressure on aquatic systems and member states need to improve anticipation and intensify work on achieving good status in their waterbodies.
Attention should be paid to the supporting elements listed in annex V of the WFD, which includes salinity as well as nutrients, acidification, thermal and oxygen conditions.
The Commission and Member States will continue to work to improve implementation in these areas.

READ THE FULL REPORT:
HTTPS://PUBLICATIONS.JRC.EC.EUROPA.EU/REPOSITORY/HANDLE/JRC132271

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