

## CROSSDRO: Cross-sectoral Drought Impacts in Complex European Basins

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### Identifying pressures

Droughts are pervasive and hazardous events, which impact multiple domains including agriculture, water resource management, ecological management, infrastructure, waterway navigation and forestry. Ireland's 2018 drought for example had severe impacts across sectors. Agriculture suffered from reduced grass growth, fodder shortages, and decreased crop yield. Peatlands faced increased wildfire risk and ecological degradation. Water management was challenging amid supply issues, low water levels and a heightened demand for resources. Canals, waterways, and rivers experienced weed growth, navigation problems, fishing restrictions, and reduced fish health. Forestry saw increased tree deaths, especially in peatland plantations. Livelihoods were also compromised, with groups such as farmers requiring additional supports.

### Informing policy

With these impacts and vulnerabilities in mind, CROSSDRO used high quality observational datasets to assess the changing nature of droughts and their impacts in Europe. In Ireland, specific focus was placed on the Boyne catchment area. Insights from the project have relevance for integrated water management, adaptation to climate variability and change, and drought planning.

Long-term precipitation records indicated increasing meteorological drought trends in Irish summers, particularly in the east, while other seasons and annual trends showed decreasing drought magnitudes. Attribution to anthropogenic climate change remains uncertain due to the dominance of natural variability. The project analysed hydrological drought using river flow gauges, revealing that droughts decreased in winter and increased in late spring and early autumn in Ireland, with significant increases in summer droughts in the Boyne catchment. Arterial and land drainage was found to have minimal impact on hydrological drought in the Boyne catchment, although further analysis using daily flows is needed.

To overcome data limitations, the project utilised newspaper archives from the Irish Drought Impact Database to track and quantify drought impacts. These, together with stakeholder interviews, highlighted the diverse impacts of droughts on agriculture, water management, forestry, waterway navigation,

fisheries, and ecosystems, including reduced grass growth, increased water demands, soil degradation, supply issues, weed growth, navigation problems, fishing restrictions, tree deaths, and peatland vulnerability.

### Developing solutions

The CROSSDRO project provides recommendations for policy makers to address the vulnerability of sectors and individuals to drought:

- 1. Climate change adaptation:** Acknowledge the significant increases in summer drought in Ireland, which are among the highest in Europe. Incorporate drought considerations into local and sectoral adaptation plans, taking into account the cross-sectoral impacts and vulnerability revealed by the 2018 drought and the expected increase in summer droughts due to climate change.
- 2. Enhanced monitoring and data collection:** Improve the collection and analysis of meteorological and hydrological data to better understand drought patterns, trends, and impacts. Develop a publicly accessible drought monitor or early warning system in Ireland to identify vulnerable regions, predict drought occurrences, and guide targeted interventions. Monitor and collate societal and economic impacts to assess the effectiveness of drought adaptation strategies.
- 3. Extend drought planning:** Complement the National Drought Plan with local drought plans to address spatially variable vulnerability and incorporate diverse stakeholder perspectives into drought planning.
- 4. Co-produce knowledge on drought and adaptive responses:** Foster collaboration and knowledge exchange among stakeholders to facilitate better drought management. Move beyond translating scientific knowledge and engage stakeholders in iterative analyses to understand their needs and diverse understanding of droughts, creating more inclusive and effective institutional environments.

Implementing these recommendations could enhance Ireland's capacity to cope with drought events and strengthen resilience across sectors and communities.

