2018 ICP Waters report: Regional assessment of the current extent of acidification of surface waters in Europe and North America

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Objectives

• Assess the current extent of surface water acidification in Europe and North America
  – Identify REGIONAL EXTENT and SEVERITY of surface water acidification
  – Identify POTENTIALLY ACIDIFIED regions where lack of sufficient data availability

• Relevant for informing CLRTAP and NEC Directive
  – Address the need for further emission reduction
  – Highlights how surface water monitoring is used to document ecosystem effects of air pollution
Call for national contributions

• Country reports
  – Acid sensitivity, acidification status and monitoring

• Data
  – From sensitive regions; larger scale surveys, not only ICP Waters sites; recent average data – current situation

• Contributors
  – Canada, Czech Republic, Finland, Germany, Ireland, Italy, Latvia, Netherlands, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom, United States
Relations between acid deposition and surface water acidification

![Graph showing catchment depositions and lake concentrations over time with a fish icon and Černé Lake, Czech Republic text.]
Available maps of critical loads exceedance

- Exceedance of critical loads = acidification likely
- No longer exceedance ≠ no longer acidified
Sensitivity and S deposition - Europe
National data – acidification status (ANC)

ANC in Europe [ueq/l]

ANC in North America [ueq/l]
National data submitted to ICP Waters

• Acidification is observed in all countries
  – Regional issue or smaller scale
  – Still severe or close to chemical recovery

• Differences in types of datasets – comparison must be made with care
Water Framework Directive also reports on acidification status

- Water Framework directive is EU policy instrument for maintaining good ecological status of (surface) waters
- Ecological status is reported for ‘all’ water bodies → Lakes >0.5 km², rivers with catchment >10 km²
- Acidification status one of several quality elements
- Reporting system does not guarantee consistent information on acid deposition impacts on surface waters
## Water Framework Directive Data

### Acidification Status Rivers

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<tr>
<th>Country</th>
<th>Count</th>
<th>Percentage</th>
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**Legend:**
- Less than good
- Good
- High
- Not applicable
- Monitored but not used
- Unknown

### Acidification Status Lakes

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</tr>
</tbody>
</table>

**Legend:**
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- Unknown
Country reports – sensitivity to acidification

Czech Republic

Ireland

Poland
Country reports - status

- Norway: 7% of area has acidified lakes
- Sweden: 10% of lakes acidified

Maps showing regions in the United Kingdom, Spain, and Norway with different classifications for lake acidity.

Classification 2015 Ca 1880, TOC 2015:
- High
- Good
- Moderate
- Poor
- Bad
Country reports - trends

United States

1980s

2017

ANC (µeq L⁻¹)

< 20
20 - 50
50 - 200
200 - 500
> 500

Heleen de Wit
Country reports – extent & severity

Most severe
• Norway, Sweden, the UK
• US, Ireland
• Netherlands, Czech Republic
• Canada, Finland, Switzerland
• Germany, Italy, Poland
• Spain, Latvia

Minor problem
• BUT local hot spots may occur even where acidification is not a major, regional issue
• Surface waters in Germany, Italy, Poland and, to a lesser degree, Finland, Switzerland and Canada seem closest to chemical recovery
• No information on biological recovery!
Acidification in regions where national reports are lacking

- Based on literature and partly WFD results

- **Strong evidence of acidification**: Slovakia, Russia and Armenia

- **Likely (WFD reporting)**: Belgium (Luxembourg)

- **Former data, but no current data**: France, Bulgaria, Romania

- **Acid-sensitive & deposition, no data**: West Balkan countries

- Possibly smaller acid-sensitive areas with sufficient deposition to cause acidification; can’t be identified from the low resolution European maps.
Importance of NEC directive monitoring

• Representative
  – Allows upscaling
  – Expectation of increased monitoring in some countries

• Targeted
  – Relevant sites and parameters

• Wider coverage
  – Obligation for all EU countries (with sensitive areas)

• Contribute to review of critical loads and levels
  – Important for further emission reductions
Summarizing

• Surface water acidification remains an issue, but extent and severity varies
• Acidification can occur in countries where there is currently little information
• NEC Directive monitoring will help
• EU WFD reporting of limited value for assessing surface water acidification
• Further emission reductions useful for reaching and speeding up recovery
• Formal document of summary available at UNECE homepage
• Report will be available at ICP Waters homepage in the beginning of October (www.icp-waters.no)
Why surface waters take time to recover

• Recovery is slow
  – Replenishment of base cations slow process
  – Biological recovery requires stable chemistry above critical limits and dispersal

• Climate change and intensified forestry may counteract recovery
Outline of the report

• Acid sensitivity and regions with potentially acidified surface waters

• Acidification status overview from
  – Submitted national data, Water Framework Directive

• Country reports

• Discussion
  – Current extent of acidification
  – Do we have sufficient information?
    • Role of NEC Directive monitoring
  – The future of acidified surface waters
Do we have sufficient information?

- Limited reporting of critical loads for water
- Low/reduced regular monitoring, few large surveys
- Regions with sparse/no recent information
- WFD data insufficient and ambiguous
  - Large water bodies – missing the most sensitive systems
  - Different approaches to assigning acidification status
  - Unclear whether not reported = not relevant
  - Difficult to identify whether the acidification is due to air pollution