

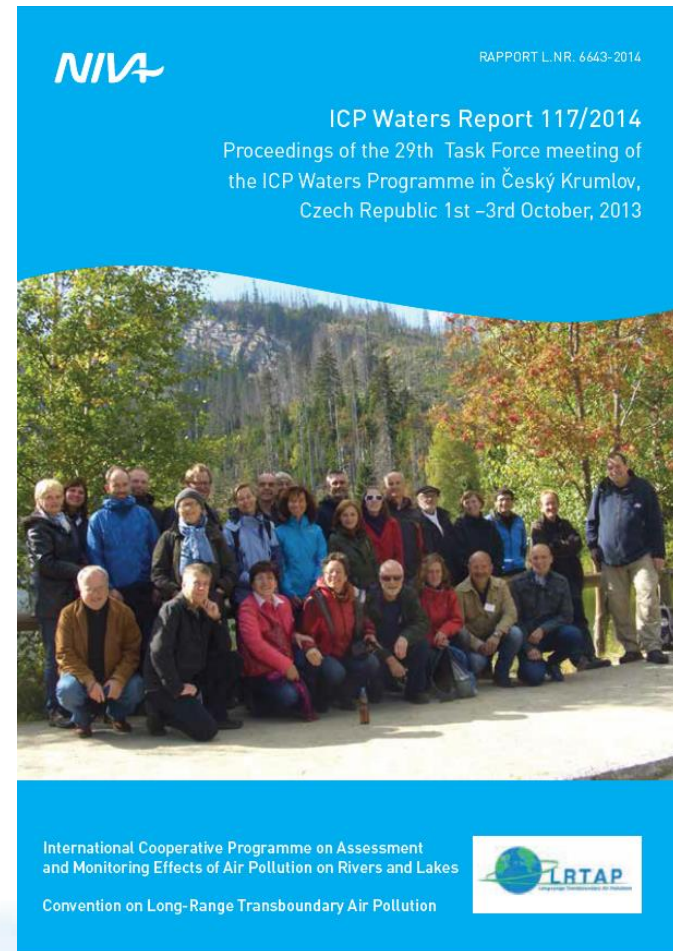
ICP Waters – **Effects of air pollution on rivers and lakes**

Report of the International Cooperative
Programme on Assessment and Monitoring of
Acidification of Rivers and Lakes

Heleen de Wit
Head of Programme Centre ICP Waters

Task Force meeting 2013

- October 1-3, Český Krumlov, Czech Republic
- 29 experts from 11 countries
- 20 countries participate regularly in ICP Waters activities
 - 30 when counting the chemical intercomparison

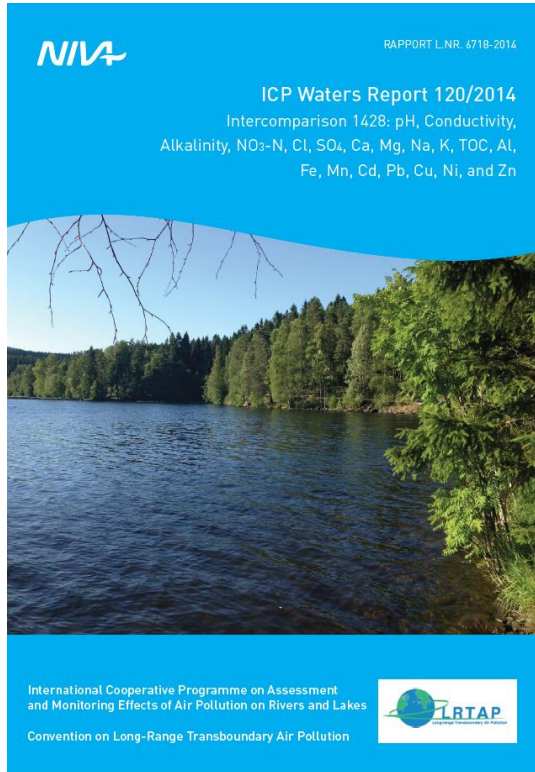


	Chemical data	Biological data	Participation in TF meetings 2011-2013	Participating in chemical intercomparison	Participating in biological intercalibration 2011-2013
Armenia	2013		•		
Austria	2013		•	•	
Belarus	2013				
Canada	2012		•	•	
Croatia			•		
Czech Rep.	2013	2011	•	•	•
Estonia	2013		•	•	•
Finland	2013		•	•	
France				•	
Germany	2013	2013	•	•	•
Ireland	2012		•	•	
Italy	2013		•	•	
Latvia	2013	2012	•	•	•
Montenegro	2012				
Netherlands			•	•	
Norway	2013	2012	•	•	•
Poland	2013		•	•	
Russia			•	•	
Spain	2013		•	•	
Sweden	2013	2012	•	•	•
Switzerland	2013	2013	•	•	•
UK	2013	2010	•	•	•
USA	2012		•	•	
Total	19	7	20	19	8

Key ICP Waters reports

- ICPW 115/2013: Effects of long range transported air pollution (LRTAP) on freshwater **ecosystem services**
- ICPW 114/2013: **Biodiversity** in freshwaters: temporal trends and response to water chemistry
- ICPW 108/2011: Impacts of air pollution on freshwater acidification under **future emission reduction scenarios**; ICP Waters contribution to WGE report.
- ICPW 106/2011: **Trends in precipitation** chemistry, surface water **chemistry** and aquatic **biota** in acidified areas in Europe and North America from 1990 to 2008.
- ICPW 101/2010: **Nutrient enrichment** effects of atmospheric N deposition on biology in oligotrophic surface waters – a review.
- ICPW 97/2009: An assessment of **mercury** in the freshwater aquatic environment related to long-range transported air pollution in Europe and North America.
- ICPW 89/2007: **Review** of the **Gothenburg Protocol**: Chemical and biological responses in surface waters and soils.
- ICPW 83/2006: **Critical Loads**, Target Load Functions and **Dynamic Modelling** for Surface Waters and ICP Waters Sites.
- ICPW 79/2005: An assessment of **Persistent Organic Pollutants** related to long-range air pollution in the aquatic environment.

New ICP Waters publications



- 120/2014 Chemical intercomparison 1428
- 118/2014 Biological intercomparison 1713
- 117/2014 Proceedings Task Force meeting 2013

Water, Air, & Soil Pollution
February 2014, 225:1880

Trends in Surface Water Chemistry in Acidified Areas in Europe and North America from 1990 to 2008

Øyvind A. Garmo, Brit Lisa Skjelkvåle, Heleen A. de Wit, Luca Colombo, Chris Curtis, Jens Fölster, Andreas Hoffmann, Jakub Hruška, Tore Høgåsen, Dean S. Jeffries, ... [show all 21](#)

New findings of particular interest to Convention

- Ecosystem services report
 - Finished in 2013
- Trend report
 - To be finished in 2014
- Biodiversity and climate and report
 - Preliminary results in 2014, to be finished in 2015

Ecosystem services – report 115/2013

- Main ecosystem service affected by acidification of freshwaters:
 - Loss of sport fisheries
 - Brown trout
 - Atlantic salmon
 - Economic impacts, tourism, biodiversity, aesthetic and cultural values
- A thorough analysis of costs and benefits of reducing acid deposition in terms of ecosystem services is lacking



Trend report on surface water chemistry & biology

- Key question
 - Is climate affecting chemical recovery of surface waters?
- Aims
 - Analyse trends in water chemistry between 2000 and 2012
 - Simulate expected water chemistry between 2000 and 2012 using deposition, climate and catchment information
 - Calculate water chemistry in Europe based on deposition scenarios for 2020/2030.
- In cooperation with ICP-IM

Sites from Europe and North America

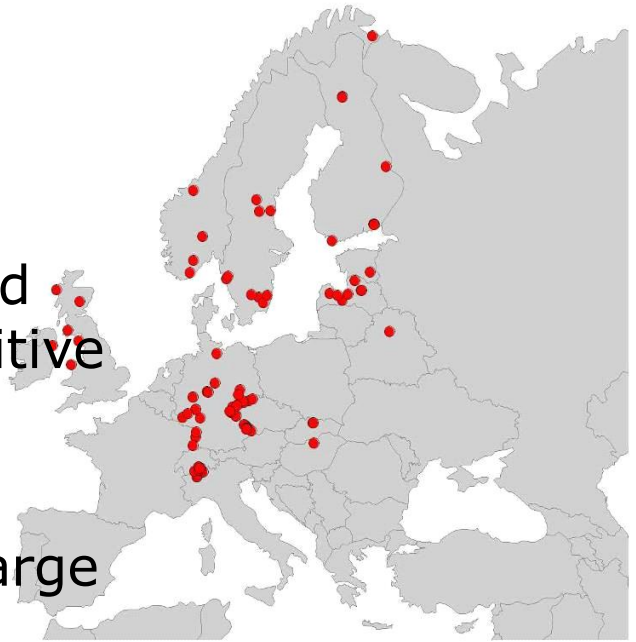
Country	Stations
Austria	1
Belarus	1
Canada	18
Czech R.	6
Estonia	1
Finland	8
France	1
Germany	35
Hungary	1
Ireland	10
Italy	6
Latvia	7
Norway	8
Poland	3
Russia	10
Spain	1
Sweden	10
Switzerland	9
UK	6
USA	122
Total	264

- **Data**

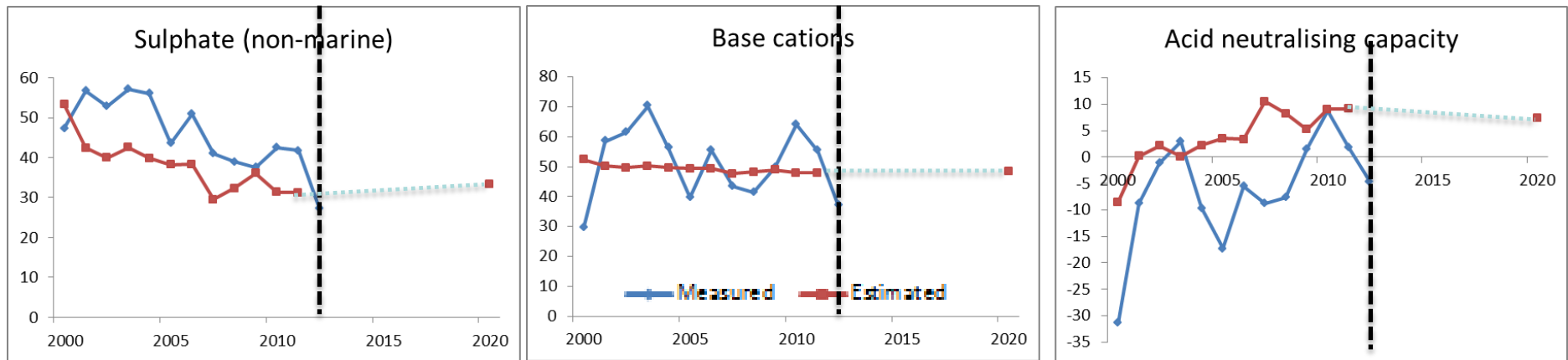
- Circa 200 lakes and rivers in acid-sensitive regions
- EMEP deposition
- Climate and discharge

- **Methods**

- Trend analysis: Kendall family of tests or other
- Prognosis: Henriksen's F-factor model



Preliminary results- example from Birkenes

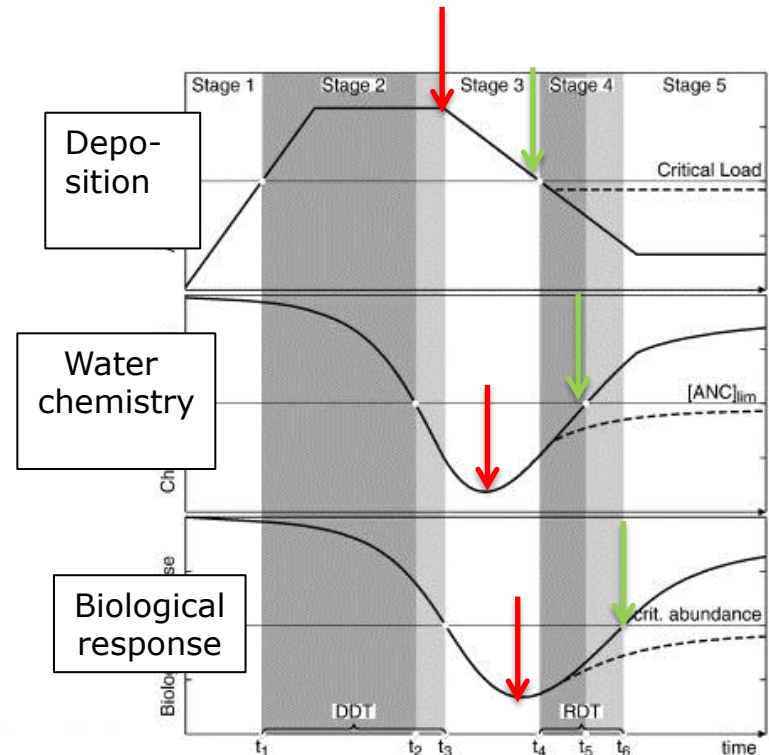


Preliminary conclusions

- Decreased sulphate deposition drives trends in chemical recovery
- Variations in observed water chemistry relate partly to climate
 - Evaluation of model description of observations = ground truthing
- No significant chemical recovery is expected in 2020
- Climate-related variation in water chemistry is significant and will affect chemical recovery

Biodiversity and climate

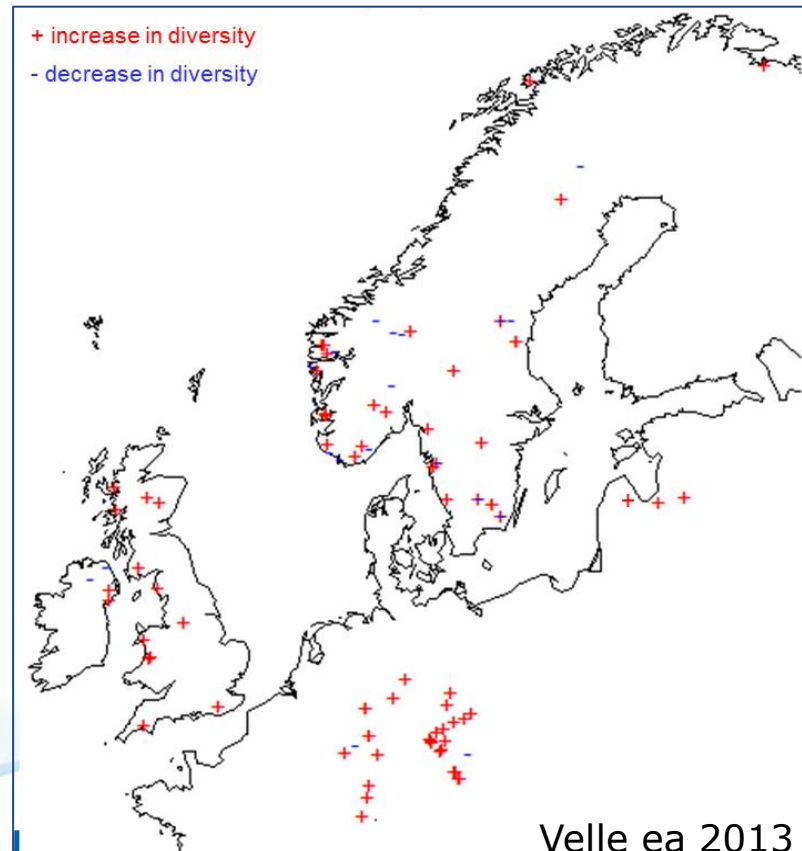
- Reduced sulfur deposition leads to chemical recovery of surface waters
- Chemical recovery leads to biological recovery
- *Does climate interfere with biological recovery?*



Posch et al 2003

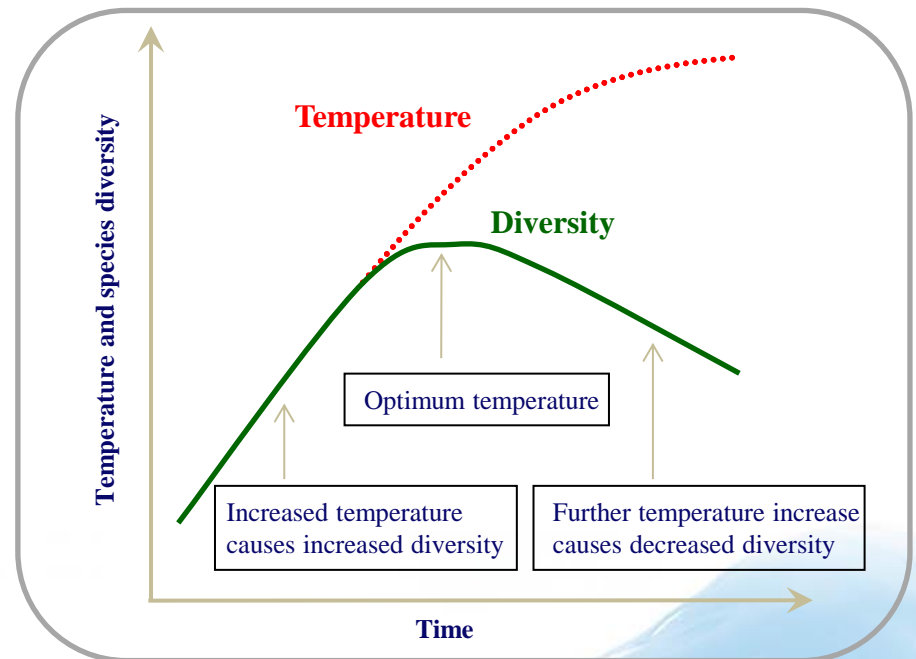
Biodiversity in European freshwaters – report 114/2013

- Benthic invertebrates and water chemistry from 55 rivers and 34 lakes from 1982 to 2011
- Biodiversity indices include ALL species.
- Acidification indices include ONLY acid-sensitive species
- Conclusions: The overall biodiversity for most sites has increased since the 1980s
- Follow-up: *does climate interfere with biological recovery and biodiversity in acid-sensitive freshwaters?*



Possible effects of climate change

- Statistical analysis of biological trends and relations to water chemistry and climate
- Preliminary results to be presented at TF meeting in October



Other items

- Nitrogen
 - Several countries noted recent decreases in surface water nitrate related to N deposition and climate change
- Sulphur
 - Long timeseries document relations between S deposition, S in surface waters and biological status
- Heavy metals – mercury
 - Mercury in fish in Sweden, Norway and Canada often exceeds limits advised for human consumption
 - Some areas show signs of increasing mercury in fish

Other items - 2

- Dynamic modelling/critical loads
 - Lakes in Italy and Switzerland may not show sufficient chemical recovery despite considerable reductions in emissions of S and N
- EECCA
 - Armenia has started water chemistry monitoring, but lacks sufficient deposition monitoring stations in background areas
- Biological intercalibration
 - Three laboratories from three countries participated

Other items - 3

- Chemical intercomparison
 - Thirty-three laboratories from 12 countries participated
 - A reduction compared with earlier
 - A fee is asked for laboratories that do not analyse samples for ecosystem monitoring programmes
 - Valuable tool for quality assurance of laboratory analyses
- Participation in other groups under the Working Group on Effects
 - ICP Modelling and Mapping
 - ICP Integrated Monitoring
 - Joint Expert Group on Dynamic modeling

WP 2014 to 2015 – future reports

- **Items for discussion at TF meeting in October:**
 - **Cooperation with ICP IM**
 - **2014:** Finalize trend report
 - **2015:** Finalize report on climate and biodiversity.
 - **2015:** Coordinate and contribute to common trend assessment for all ICPs
 - **2016:** Contribute to common WGE-EMEP assessment report
 - **2016:** New thematic report

Task Force meeting 2014

- Grimstad, Norway
- October 14 to 16

