2020-2021 WGE activities

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41th session Executive Body

6 – 8 December 2021

Health

Improving tools to assess air pollution effects in the ECE region

- New WHO Global Air Quality Guidelines (launched in september 2021)
  - Revised AQ guidelines levels and interim targets for PM, NO_2, O_3, SO_2 and CO

- Evaluate the current knowledge on the health risk of PAHs:
  - Identification of critical gaps
  - Technical report by the end of the year *'Human Health Effects of Polycyclic Aromatic Hydrocarbons (PAHs) as Ambient Air Pollutants'*

- Capacity building activities: downscaled due to the pandemic

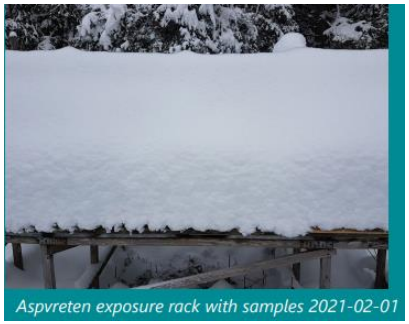
2022-2023 workplan

- A report on methods for health risk/impact assessment of air pollution and cost-benefit analysis (update to HRAPIE project)
- Update of tools for quantification of the health impacts of air pollution, including links to climate change mitigation
- Promote health messages related to air pollution in Europe: workshop on risk communication

Materials

https://www.ri.se/en/icp-materials

Monitoring impacts on corrosion and soiling effects on materials



Aspvreten exposure rack with samples 2021-02-01

- Exposure for trend analysis 2017-2021 (1 and 4 years samples)
- First results will be presented in 2022
- New trend report including environmental data in 2023

Revision of the Mapping Manual, Chapter 4, to include soiling (2021)

- Dose-response functions for non-transparent materials (30% loss of reflection and cleaning intervals for 10 and 15 years)
- Dose-response functions for modern glass (haze value of 1% and 3% for 2050 for cultural heritage and technical constructions)

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Effects of air pollution on Materials
https://unece.org/sites/default/files/2021-08/ECE_EB.AIR_GE.1_2021_13-2110764E.pdf

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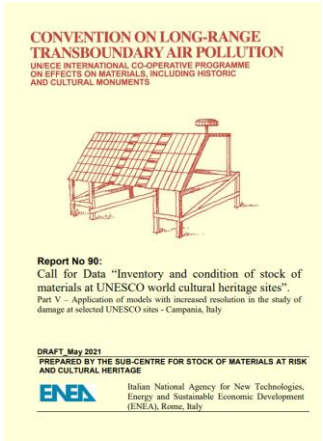
Materials

https://www.ri.se/en/icp-materials

Policy-relevant user-friendly indicators (UNESCO sites)

- Report focused on the relative importance of individual pollutants regarding the cost of damage for selected UNESCO sites (2020)
- Depending on monuments and environmental conditions, 2050 target is achieved by pollutants reduction of 20-50% that allows a **saving in maintainance/repair cost** due to air pollution **of 32-40%** for both Limestone recession and Copper corrosion.



- Based on the call for data at UNESCO sites it is **possible to estimate savings in maintenance / repair costs** depending on different pollution scenarios. The estimation will be more accurate using the new models with increased geographical resolution

Effects of air pollution on Materials
https://unece.org/sites/default/files/2021-08/ECE_EB.AIR_GE.1_2021_13-2110764E.pdf

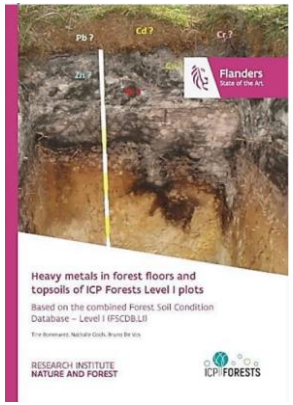
Forests

http://icp-forests.net/

2020-2021 workplan

- Ozone effect on radial tree growth across Europe (paper in preparation, 2021)
- N deposition and its effects on forest vegetation: status and trends in European Forests (2020, 2021)

- Status and trends of heavy metals in forest ecosystems



Maps of concentration levels in forest floors and topsoils across Europe:

- 1st survey period (1985-1999)
- 2nd survey period (2000-2015)

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Effects of air pollution on Forests
https://unece.org/sites/default/files/2021-08/ECE_EB.AIR_GE.1_2021_11-2110977E.pdff

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Forests

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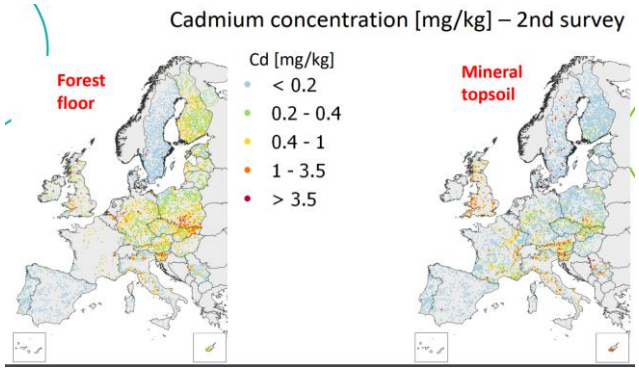
Status and trends of heavy metals in forest ecosystems

1. **Heavy metal specific variation patterns** in forest floors and topsoils are found within countries, biogeographical regions and Europe.



2. Regional **hotspots** of elevated HM concentrations
   - are clearly visible on maps and
   - can be **linked to local pollution** sources and well-known contaminated areas.

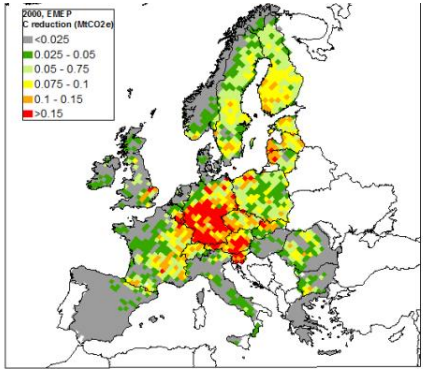
3. Compared to the mineral topsoil, **heavy metals accumulate significantly** more in the **humus layer.**

4. Generally the **HM concentrations** in forest soils **have declined from 1990** onwards, although rates of change differ by heavy metal and between countries.

Vegetation

https://icpvegetation.ceh.ac.uk/

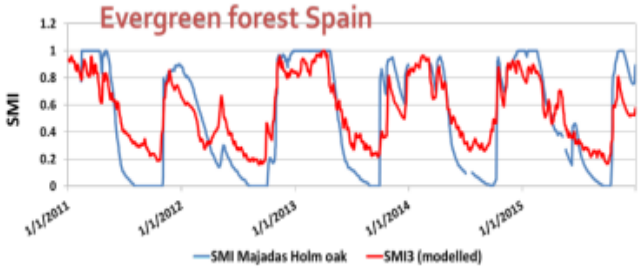
Effect of Ozone on living biomass (C sequestration) of sensitive trees



- Based on gross annual increment and using dose-response relationships for 12 species/species groups
- **Ozone fluxes** in 2000 **reduced the increase in C storage** by 12.6% (EMEP model)
- Also affected by soil moisture – particularly in the Mediterranean region.

Ozone risk assessment in soil moisture limited areas and under future climatic conditions

- Improving POD-based O_3 risk assessment
- SMI overestimated by models
- Next steps: Further development of soil moisture parameters and **assessment of effects of drought** on POD estimation **across Europe**



Vegetation

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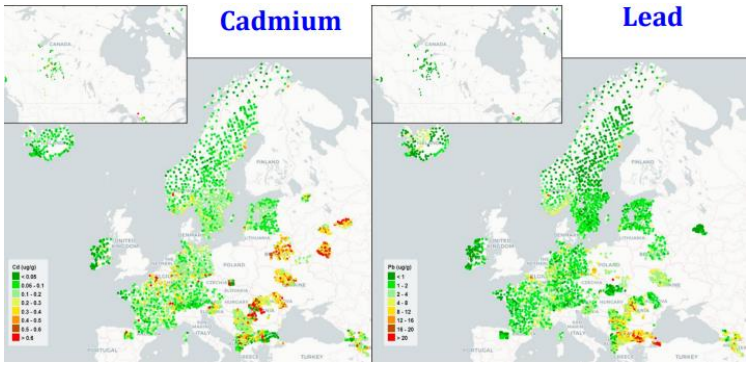
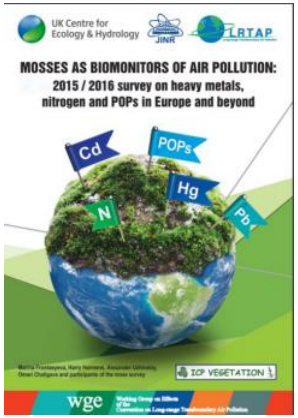
Moss survey



- NW to SE gradient in Europe
- Higher concentrations in (south) east due to anthropogenic sources and high wind resuspension?
- Final report for 2015/2016 now available

- Next survey 2020-2022: Call for data (HM, N POPs). Approximately 1500 sites sampled already
- Include pilot study on mosses as biomonitors of microplastics
- Participants in moss survey 2020-2022:

  Albania, Armenia, Georgia, Germany, Greece, Italy, Kazakhstan, Latvia, Netherlands, North Macedonia, Russia, Slovakia, Sweden, Switzerland, UK, Vietnam.



Waters

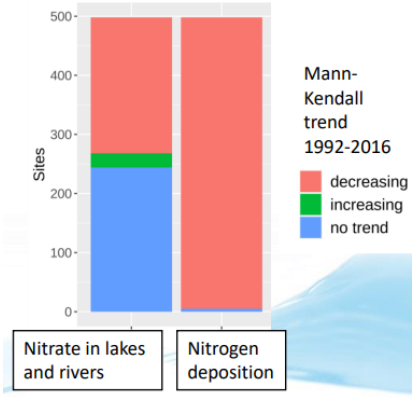
https://www.icp-waters.no/

Eutrophication effects of N dep in nutrient-poor natural surface waters

- Data analysis of >300 lakes in Sweden, Norway and Finland, grouped into 18 regions with contrasting N deposition levels
- Algal growth in freshwaters is strongly related to availability of phosphorus (P limitation)
- Algal biomass per unit P increases with total N deposition below ca 4 kg N ha/yr, suggestion N limitation for these lakes

Controls on trends in nitrate in lakes

- N deposition is mostly decreasing, but Nitrate concentration in 50% of all lakes and rivers is constant
- Nitrate in surface waters does not show a simple response to deposition: Climate, land use and land cover all determine how surface waters react to changing N deposition



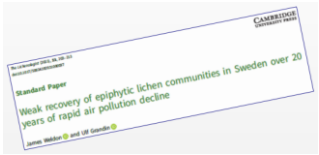
Effects of air pollution on rivers and lakes
https://unece.org/sites/default/files/2021-08/ECE_EB.AIR_GE.1_2021_12-2111028E.pdf

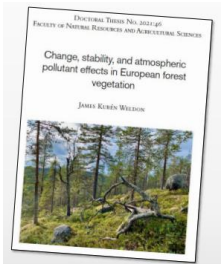
Integrated monitoring

https://www.syke.fi/nature/icpim

Long-term study of epiphytic lichens:

- Only weak or no recovery in the epiphytic lichen community despite rapid decline in air pollution.





- Due to slow colonisation rate lichens do not always indicate increasing air quality (but are still considered as quick indicator of decreasing air quality)

Critical Load exceedances and ecosystem impacts of N and S deposition at unmanaged forests

- The temporal developments of CL exceedance indicated the more effective reductions of S deposition compared to N at the sites.
- The results provided evidence on the link between CL exceedances and empirical impacts
- The results also confirm that emission abatement actions are having their intended effects on CL exceedances and ecosystem impacts

Integrated monitoring on air pollution effects on ecosystems
https://unece.org/sites/default/files/2021-08/ECE_EB.AIR_GE.1_2021_15-2110765E.pdf

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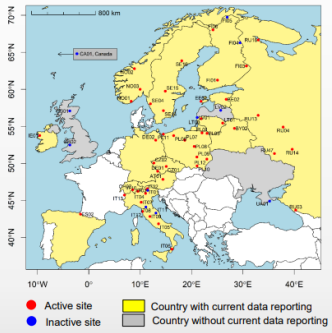

Integrated Monitoring sites, 2021:

15 active countries

48 active sites

Extended ICP Monitoring Strategy:

- Expand IM network to more sites and other ecosystem types
- Different levels of monitoring to facilitate the establishment of new sites

  - Level 3: Full ICP IM site (monthly, catchment as stated in the ICP IM Manual) - No changes to current practices

  - Level 2: Plotscale with budgets on other ecosystem types (monthly)

  - Level 1: Plotscale without budget (aiming for annualmeasurements, but accepting other temporal resolution) of soiland vegetation (plant list, cover and chemistry)

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Integrated monitoring on air pollution effects on ecosystems
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Integrated monitoring

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Change of IM Programme Center

- The Finnish Environment Institute (SYKE) ends its hosting of the IM Programme Centre: 33 years of a tremendous job
- The Swedish University of Agriculture (SLU) will host the Programme Center

WGE would like to express our gratitude to Finland for hosting the Programme Center. But specially to Martin, Sirpa, Maria and Jussi.

WGE recommends that the EB amend decision 2002/1 on the financing core activities to reflect the change

Modelling and Mapping

https://www.umweltbundesamt.de/en/Coordination_Centre_for_Effects
https://www.ivl.se/projektwebbar/centre-for-dynamic-modelling.html

Update of the CL database

- 8 contributions of new datasets for SMB CL; 6 confirmation of previous datasets for SMB CL; 7 contributions on Empirical CL
- For the rest of the Parties, CL data of the newly updated European Background Database is applied (Report available)

Review and revision of Empirical Critical Loads (N)

- Process coordinated by CCE, 45 authors
- Completion and publication of the new report on CL in 2022

Center on Dynamic Modelling

- Review of the dynamic modelling work under the Convention
- Report on indicators of damage to biodiversity

Contributions to the GP review Report

https://unece.org/sites/default/files/2021-08/0%20V2%20WGE%20supporting%20text%20to%20the%20GP%20review%2018Sept2021.pdf

Key messages

- Materials: *corrosion* decreased significantly since the early 1990s. SO_2 levels, carbon steel and copper corrosion have decreased even after 1997. For *soiling*, there is no decreasing trend after 1997 and consequently larger areas in Europe are above acceptable levels.

- Risk of acidification of freshwater ecosystems: Despite large and effective efforts across Europe and North America, in some areas, air pollution still constitutes a threat

- Eutrophication is still a threat for terrestrial ecosystems

- Ozone: Estimates of wheat yield based on ozone fluxes predict yield losses in 2030 of 5.8%, 6.8 % and 7.6% in North America, Europe and the EECCA countries. Ozone risks to biodiversity will still occur by 2050. Significant effects of ozone on the biomass increment of trees will remain

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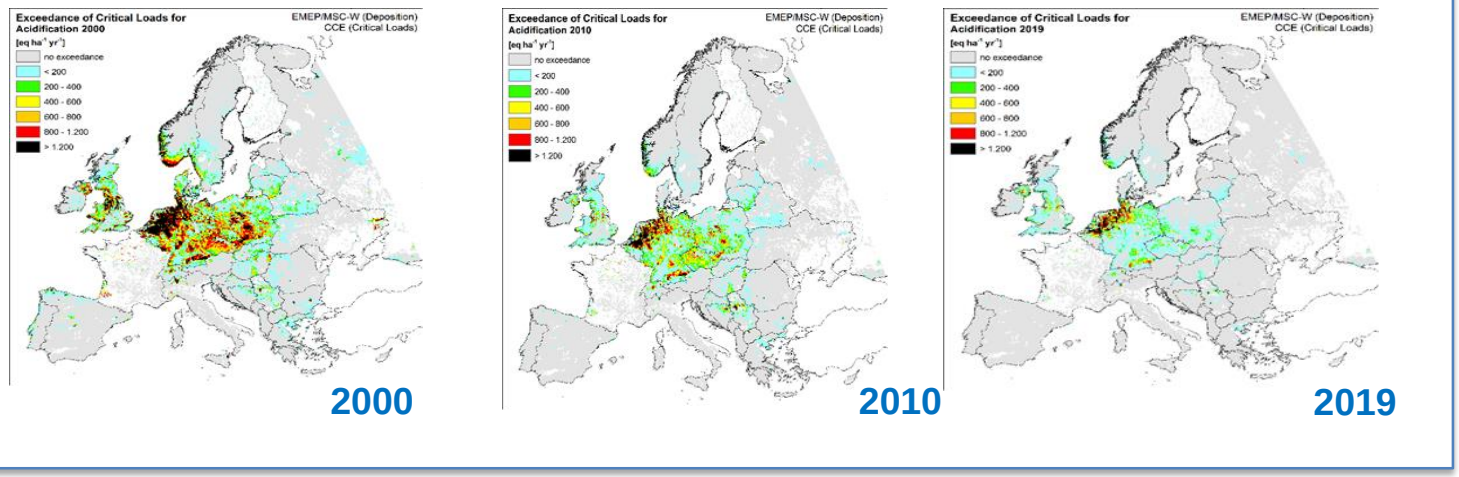
Exceedance of CL for acidification



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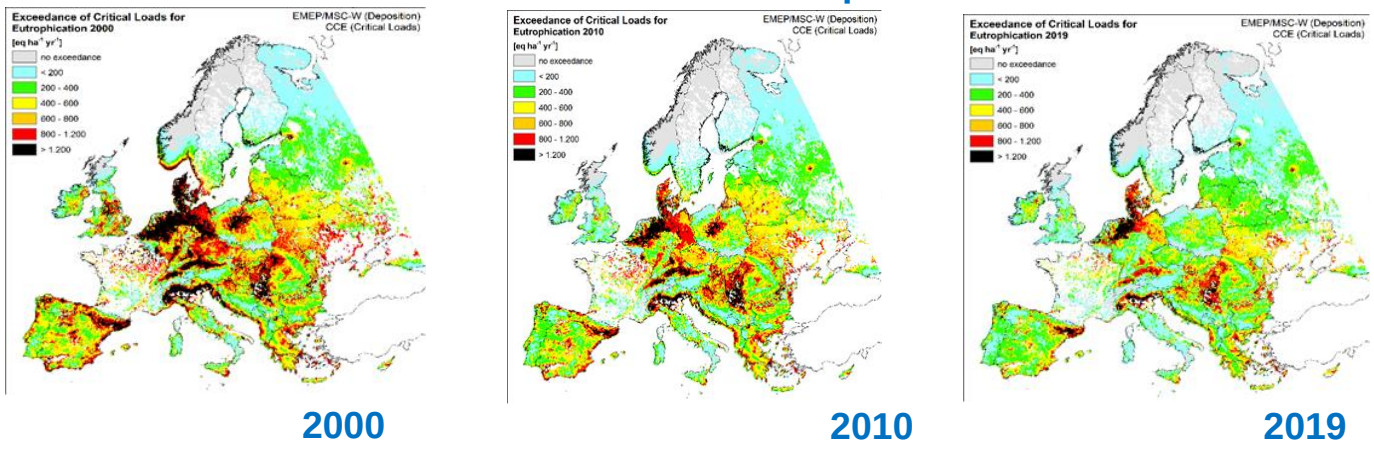
Exceedance of CL for eutrophication



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Thank you for your attention

For more information

2020 Joint progress report on policy-relevant scientific findings

(https://unece.org/info/Environmental-Policy/Air-Pollution/events/350954)

ICPs and TF Annual Reports (UNECE website)

ICPs and TF Technical Reports (at TF and Programme Centers websites)

UNECE Convention on Long Range Transboundary Air Pollution