ICP Integrated Monitoring of Air Pollution Effects on Ecosystems – ICP IM

Ulf Grandin, Salar Valinia & Martin Forsius
ICP Integrated Monitoring

Main objectives of ICP IM:

• To **monitor** the biological, chemical and physical state of ecosystems **over time** in order to provide an **explanation of changes** in terms of **causative environmental factors**, including natural changes, air pollution and climate change, with the aim to **provide a scientific basis for emission control**.

• To **develop and validate models** for the simulation of ecosystem responses and use them (a) to **estimate responses** to actual or predicted changes in pollution stress, and (b) in concert with survey data to make **regional assessments**.

• To carry out **biomonitoring** to **detect natural changes**, in particular to **assess effects of air pollutants and climate change**.
Integrated monitoring sites

16 countries
50 active sites
Ireland restarted
Switzerland one new site
Poland has joined

Plans to contact "white" counties for invitation to join.
**Summary of recent activities**

**Scientific papers in priority topics, from 2018**


Highlights, Vuorenmaa et al. 2018

- Trends in runoff fluxes of SO$_4$ have increasingly responded to the decrease in S emissions.
- Trends in NO$_3$ concentrations in deposition and runoff are predominantly decreasing.
- Trends in inorganic N output fluxes are still highly variable.
- Variation of SO$_4$ in runoff was most powerfully explained by deposition pattern.
- No clear signs of a consistent climate-driven increase in inorganic N loss in forest catchments.
Highlights, Holmberg et al. 2018

- VSD+ dynamic soil model was applied at diverse LTER-Europe sites.
- We employ data from LTER, UNECE ICP IM and ICP Forest networks.
- Soil pH and BS were projected to increase under decrease in S, N deposition.
- Simulations with climate warming gave more variable results.
- Climate warming led to higher soil C:N at half of the sites, lower at one third.
Summary of recent activities

Ongoing studies

- Test of ecological resilience at one storm and bark beetle affected IM site (SE 14, Aneboda). *Weldon & Grandin, submitted.*

- **Conclusion:** Resilience in the plant community is increased by refuge areas functioning as a form of conservative ecological memory.

  2005: Storm

  2007-2009: bark beetle
Summary of recent activities

Ongoing studies

- Currently legislated decreases in nitrogen deposition will yield only limited plant species recovery in European forests. Dirnböck, T. et al., submitted.

- **Conclusion**: The decrease in N deposition under current legislation emission reduction targets until 2030 did not result in a release from eutrophication in the plat community.
Summary of recent activities

Other priority activities by ICP IM

• TF meeting with ICP Waters, in Poland, May 2018.
• Contributed to the NEC directive guidelines
• Contributed to the WGE Joint Report 2017.
• Contributed to the IM and Waters Joint Report on mercury in the aquatic environment (Braaten et al. 2017).
• Participates in a joint coordinated exercise on dynamic modelling together with other ICPs (Joint Expert Group on Dynamic Modelling, JEG DM):
  – site-specific modelling,
  – development/testing of new methodologies for assessing the connections between air pollution and climate change.
Progress related to 18/20 work plan

ICP IM will produce the following reports in 2019:

• Report on dynamic modelling on the impacts of deposition and climate change scenarios on ground vegetation

• Scientific paper on the relationship between critical load exceedances and empirical ecosystem impact indicators

• Scientific paper on heavy metal trends in concentrations and fluxes across ICP IM sites in Europe, in cooperation with ICP Waters

• Scientific paper on the impacts of catchment characteristics, climate and hydrology on N processes
Further development and the future

• Further work along with the Long Term Strategy, for example multiple stressors

• Increased cooperation and use of EMEP data in evaluations of IM data

• Participation in the development of the European LTER-network (Long Term Ecological Research network, www.lter-europe.net), the EU/H2020 eLTER-project, and the implementation of eLTER on the ESFRI 2018 Roadmap.

• Participation in the activities of other external organisations, particularly the International Long Term Ecological Research Network (ILTER, www.ilter.network).

• Invite more countries in Europe to join ICP IM
Problems we have/will face

• Key person for work on heavy metals will leave for another position.

• Unbalanced data reporting, hamper some data evaluation and analyses. But countries report as much as they can afford. There is a good will and sprit!
Next TF meeting

• Joint meeting with ICP Waters
• First week in June 2019
• Helsinki, Finland