ICP Forests
A policy-relevant infrastructure for long-term, large-scale assessment and monitoring of forest ecosystems

KEY MESSAGES

1. ICP Forests is a transnational forest monitoring and research network established under the UNECE Air Convention in 1985. 42 countries are currently cooperating under ICP Forests.

2. Quantitative policy-relevant information on air pollution effects on forests is collected via systematic large-scale monitoring (Level I) and intensive monitoring at permanent, highly instrumented plots (Level II).

3. Transnational harmonisation and standardisation of data collection and evaluation makes ICP Forests unique in the global forest monitoring landscape.

4. Data collected by ICP Forests are stored in a central database and are available on request to scientists across the world for research purposes.
Transnational forest monitoring and research under the UNECE

The International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) is a transnational forest monitoring and research network under the United Nations Economic Commission for Europe (UNECE) Convention on Long-range Transboundary Air Pollution (Air Convention, formerly LRTAP Convention or CLRTAP). Information on the status and trends of forest ecosystems and their responses to environmental change in Europe and beyond have been collected under ICP Forests for over 30 years. At present, 42 countries are cooperating within the ICP Forests programme.

This is the first of the new ICP Forests Briefs, which aim to provide clear and concise information on the ICP Forests monitoring programme and its latest scientific findings. These short updates are primarily directed at policymakers and the interested public offering them scientific knowledge for an informed debate on key forest-related environmental topics.

The Air Convention — the first international treaty to address air pollution on a broad regional basis

Air pollution is a global concern that is increasing in many regions of the world as the energy, agricultural, industrial, and traffic sectors continue to grow. It was first recognised as a transnational issue in the late 1960s, when large-scale acidification of surface waters in Scandinavia could be clearly connected to long-range transboundary air pollution.

The establishment of the Air Convention in 1979 was the first legally binding international agreement aiming to control air pollution in Europe and beyond. It functions within the UNECE, whose members include all the countries of Europe, the Caucasus and Central Asia, as well as the USA and Canada.

The Air Convention provides a general framework for collaboration to limit, gradually reduce and ultimately prevent air pollution. Initially aimed at reducing the effects of ‘acid rain’ through control of sulphur emissions, the scope of the Convention was later widened to include nitrogen pollutants, volatile organic compounds (VOCs), heavy metals, and persistent organic pollutants (POPs).
ICP Forests — Monitoring the effects of air pollution, climate change, and other stressors on forest ecosystems

ICP Forests operates under the UNECE Air Convention and was established as part of the Working Group on Effects (WGE) in 1985. This was in response to wide public and political concern about the extensive forest damage observed in Central Europe that was attributed to air pollution. Since then the focus of ICP Forests has widened from solely studying the impact of air pollution on forest ecosystems to include the study of other forest-related issues such as climate change effects, carbon sequestration, ecosystem services and biodiversity. Over the past few years, ICP Forests has received more than 130 data requests from scientists working in these fields.

As well as addressing the scientific information needs of the Air Convention, thereby underpinning the advancement of air pollution abatement measures in Europe, the quantitative policy-relevant information on air pollution effects on forests collected by ICP Forests can also be used by other national and international forest and environmental bodies, such as Forest Europe (FE, formerly the Ministerial Conference for Protection of Forests in Europe – MCPFE), the Convention on Biological Diversity (CBD), and the United Nations Framework Convention on Climate Change (UNFCCC).

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### Monitoring at two levels of intensity

Systematic large-scale monitoring (Level I) provides periodic overviews of the spatial and temporal variation in forest health, forest soil condition, and leaf chemistry in relation to anthropogenic and natural stressors. Monitoring at Level I plots began in 1986.

Intensive monitoring (Level II) is undertaken on a network of permanent, highly instrumented forest monitoring plots. Level II monitoring aims to foster integrative studies on cause-effect relationships of anthropogenic and natural stressors with forest condition and forest processes. Such plots generate consistent and standardised long-term data series for many ecosystem compartments and processes. More than 250 variables are collected on Level II plots. Monitoring at Level II plots began in 1994.

<table>
<thead>
<tr>
<th>Survey</th>
<th>Level I sites</th>
<th>Level II sites</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air quality</td>
<td>×</td>
<td></td>
<td>Continuously</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>×</td>
<td></td>
<td>Every 5 yrs</td>
</tr>
<tr>
<td>Crown condition</td>
<td>×</td>
<td></td>
<td>Every year</td>
</tr>
<tr>
<td>Deposition</td>
<td>×</td>
<td></td>
<td>Weekly/monthly</td>
</tr>
<tr>
<td>Foliar analysis</td>
<td>×</td>
<td></td>
<td>Every 10-15 yrs</td>
</tr>
<tr>
<td>Ground vegetation</td>
<td>×</td>
<td></td>
<td>Every 5 yrs</td>
</tr>
<tr>
<td>Growth</td>
<td>×</td>
<td></td>
<td>Every 5 yrs</td>
</tr>
<tr>
<td>Leaf area index (LAI)</td>
<td>×</td>
<td></td>
<td>At least every 2 yrs</td>
</tr>
<tr>
<td>Litterfall</td>
<td>×</td>
<td></td>
<td>Continuously</td>
</tr>
<tr>
<td>Meteorology</td>
<td>×</td>
<td></td>
<td>Continuously</td>
</tr>
<tr>
<td>Ozone injury</td>
<td>×</td>
<td></td>
<td>Every year</td>
</tr>
<tr>
<td>Phenology</td>
<td>×</td>
<td></td>
<td>Several times per year</td>
</tr>
<tr>
<td>Soil</td>
<td>×</td>
<td></td>
<td>Every 10-15 yrs</td>
</tr>
<tr>
<td>Soil solution</td>
<td>×</td>
<td></td>
<td>Continuously</td>
</tr>
</tbody>
</table>
Standardised methodology ensures high data quality

An outstanding feature of the ICP Forests programme is the implementation of a standardised approach for data collection and evaluation at every Level I and Level II plot across the entire network – in every member state and in every survey, as well as additional measures for quality control and assurance. This includes field checks, inter-calibration and cross-comparison courses, inter-laboratory ring tests, data validation procedures and internal reviewing. The transnational standardisation of methodology makes ICP Forests unique within the global forest monitoring landscape.

All surveys and methods are described in the ICP Forests Manual (see ‘Suggested reading’) which has been developed over a period of 30 years. This Manual also summarises the respective scientific background for the Level I and Level II networks and for each of the surveys.
Organisational structure for ICP Forests

Lead Country
Germany

Participating Countries
National Focal Centres (NFCs)

Task Force
Chairperson
Programme Co-ordinating Centre (PCC)

Working Group on Effects (WGE)
UNECE Air Convention Bodies

Quality Assurance Committee
Working Group on Quality in Laboratories
Scientific Committee

Programme Co-ordinating Group (PCG)

Expert Panels (EPs)

Ambient Air Quality
Biodiversity and Ground Vegetation
Crown Condition and Damage Causes
Deposition

Soil and Soil Solution
Foliage and Litterfall
Forest Growth
Meteorology, Phenology, and Leaf Area Index

Forest Soil Co-ordinating Centre (FSCC)
Forest Foliar Co-ordinating Centre (FFCC)

Data available upon request

The large range of data collected by ICP Forests is stored in a central database and managed according to an agreed data policy. Data are available for internal and external use upon request and ICP Forests invites scientists from all over the world to use ICP Forests data for research purposes.

Detailed information on the ICP Forests programme, its structure, participants, publications, and data availability is available at http://icp-forests.net

Suggested reading


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Disclaimer: ICP Forests Briefs are summaries of knowledge generated within the ICP Forests network under the UNECE Air Convention. The views expressed in this publication are those of the authors and do not necessarily represent those of the Programme Co-ordinating Centre of ICP Forests or those of the Air Convention and its bodies.