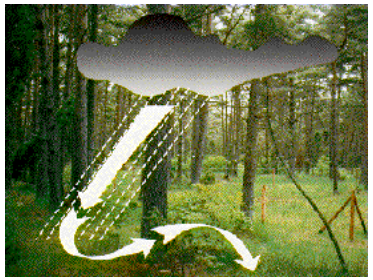


National emission ceiling – a opportunity for WGE?

Salar Valinia

Co-chair ICP IM & Swedish EPA

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

DIRECTIVES

DIRECTIVE (EU) 2016/2284 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 14 December 2016

on the reduction of national emissions of certain atmospheric pollutants, amending Directive 2003/35/EC and repealing Directive 2001/81/EC

(Text with EEA relevance)

wge Working Group on Effects of the Convention on Long-range Transboundary Air Pollution

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

The aim of the directive

In order to move towards achieving levels of air quality that do not give rise to significant negative impacts on and risks to human health and the environment, this Directive establishes the emission reduction commitments for the Member States' anthropogenic atmospheric emissions of sulphur dioxide (SO2), nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), ammonia (NH3) and fine particulate matter (PM2,5)

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

SWEDEN

	2005	2012	2020 NEC	2030 CLE	2030 NEC	2030 MTFR
SO_2	36	-23%	-22%	-14%	-22%	-18%
NO_x	175	-25%	-36%	-66%	-66%	-70%
$PM_{2.5}$	30	-10%	-19%	-16%	-19%	-48%
NH_3	56	-8%	-15%	-10%	-17%	-33%
VOC	198	-6%	-25%	-39%	-36%	-54%

POLAND

	2005	2012	2020 NEC	2030 CLE	2030 NEC	2030 MTFR
SO_2	1217	-30%	-59%	-66%	-70%	-79%
NO_x	851	-4%	-35%	-49%	-39%	-63%
$PM_{2.5}$	141	-2%	-16%	-11%	-58%	-53%
NH_3	272	-3%	-1%	1%	-17%	-37%
VOC	575	10%	-25%	-34%	-26%	-67%

UK

	2005	2012	2020 NEC	2030 CLE	2030 NEC	2030 MTFR
SO_2	709	-40%	-59%	-80%	-88%	-91%
NO_x	1592	-33%	-55%	-72%	-73%	-80%
$PM_{2.5}$	93	-17%	-30%	-28%	-46%	-57%
NH_3	302	-8%	-5%	-8%	-16%	-27%
VOC	1160	-28%	-37%	-37%	-39%	-52%

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

Brief description of the ecosystem monitoring NECD

To ensure the **monitoring of negative impacts of air pollution upon ecosystems** based on a network of monitoring sites that is representative of their **freshwater, non-forest natural and semi-natural habitats, and forest ecosystem types**, taking a cost-effective and risk-based approach (article 9 paragraph 1 first subparagraph)

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

What has to be done?

- To report by 1 July 2018 and every four years thereafter, to the Commission and the European Environment Agency, the location of the monitoring sites and the associated indicators used for monitoring air pollution impacts (article 10 paragraph 4(a))

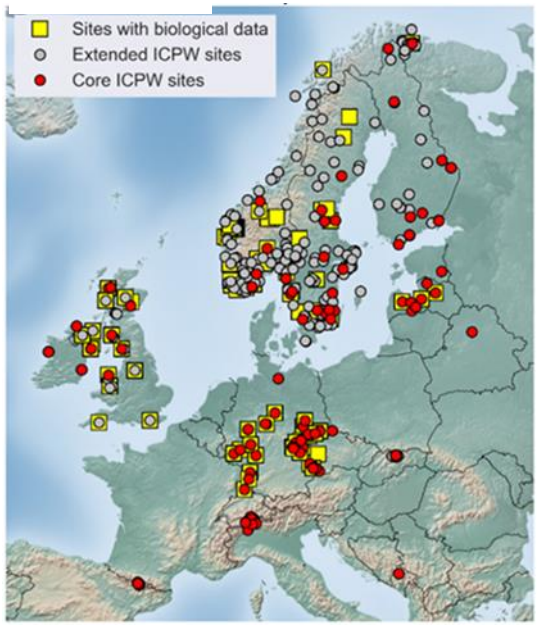
- To report by 1 July 2019 and every four years thereafter, to the Commission and the European Environment Agency, the monitoring data referred to in Article 9 (Article 10 paragraph 4(b)).

WGE Ecosystems Monitoring Network

3 ICPs: specific and complementary ecosystem monitoring covering from aquatic to terrestrial ecosystems

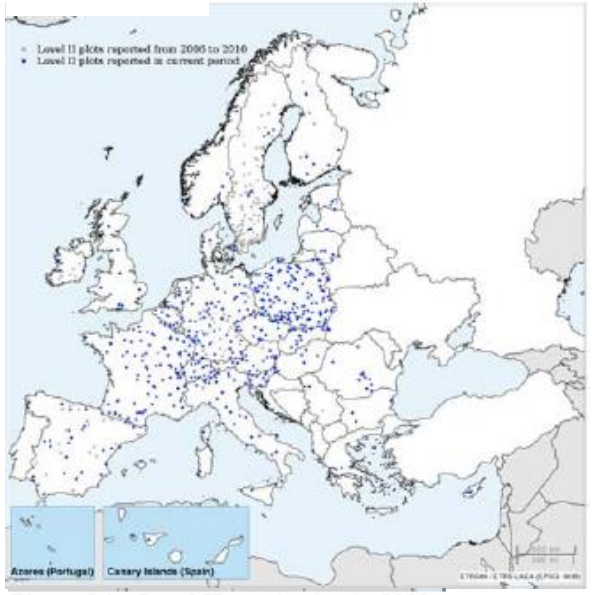
- Harmonized methodologies
- Manuals available
- Historical data sets
- Monitoring & Reporting routines
- Chemical and biological data
- Data: Collection, processing, analysis, reporting and communication
- Linked to atmospheric deposition data (sites/EMEP)

ICP- Waters



ICP-Integrated Monitoring

ICP- Forests

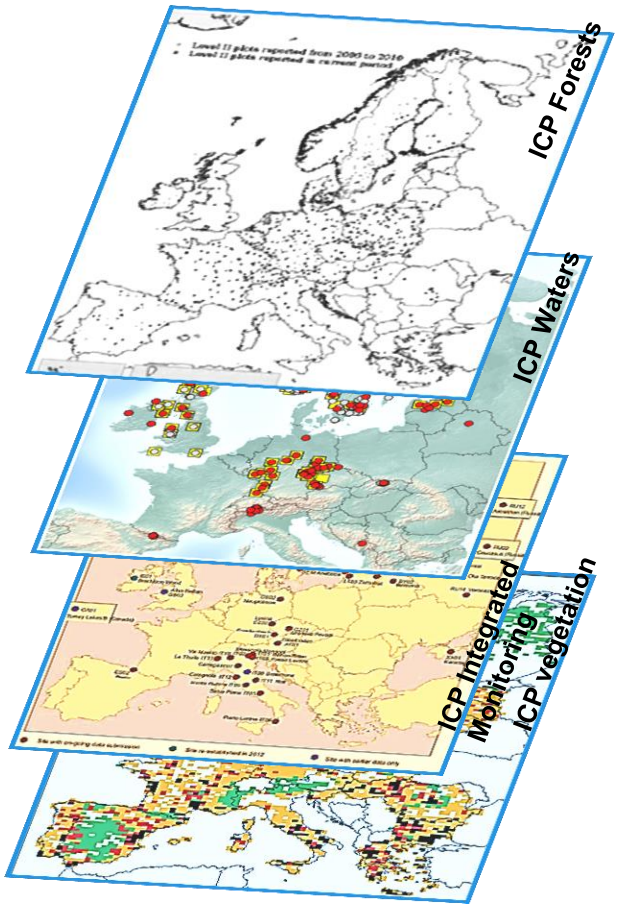


Plots of the Level II monitoring in 2009.

Courtesy of Isaura Rabajo (chair WGE)

WGE Ecosystems Monitoring Network

The existing WGE monitoring networks under the LRTAP Convention fits to the NEC Directive objectives as:



- ✓ Is an operational network
- ✓ Monitors key indicators of air pollution
- ✓ In sites that are representative of European ecosystem types

WGE provides a suitable platform for ecosystem monitoring as it has:

Tools (Methodologies & Manuals)

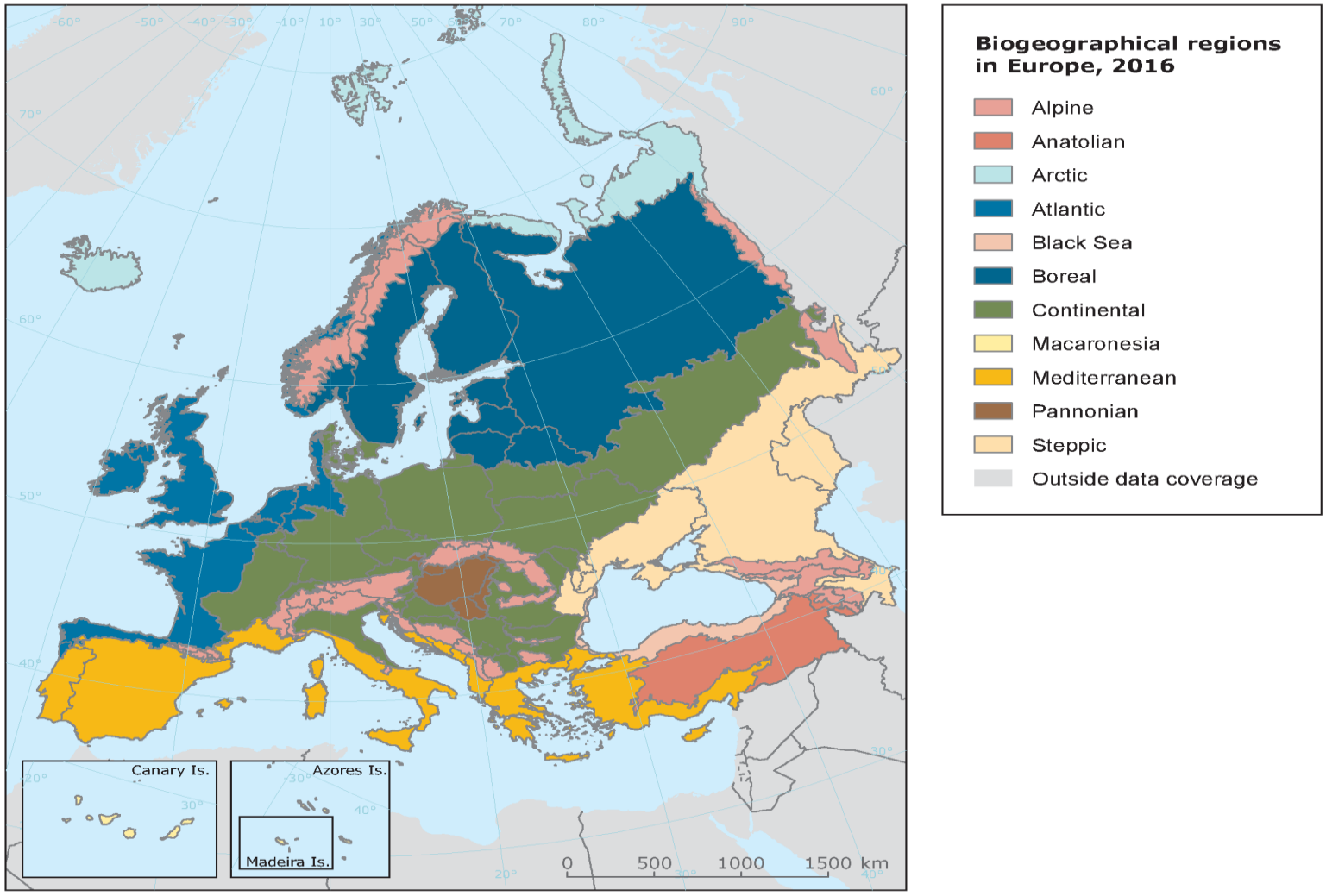
A broad panel of experts (international& multidisciplinary)

More than 20 years of experience

- Almost all MS participate in any of the ICPs related with monitoring
- Easy incorporation into the network
- Scientific and technical support

Courtesy of Isaura Rabajo (chair WGE)

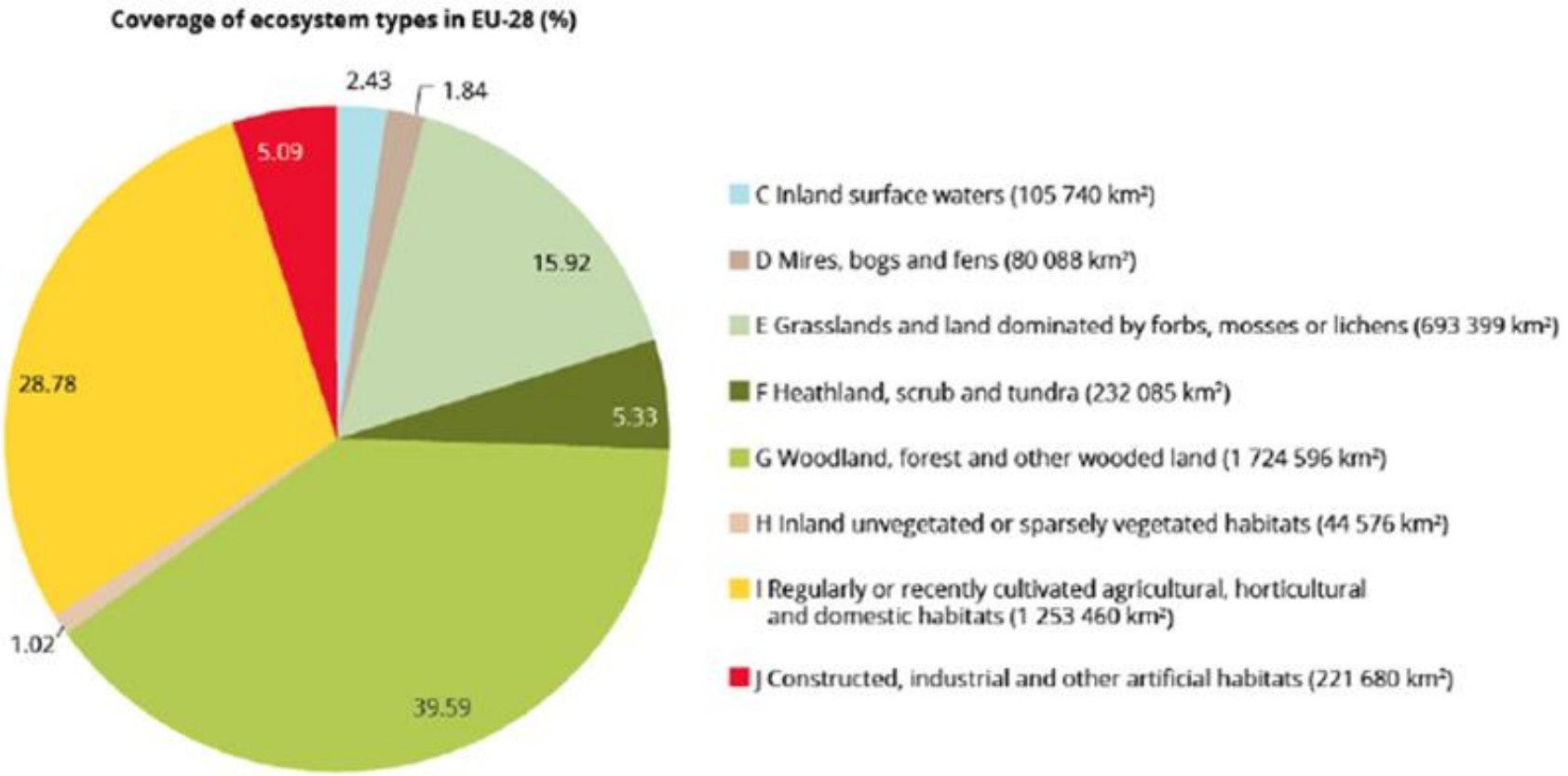
Biogeographical regions of Europe



https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3

NATUR VÅRDS VERKET
SWEDISH ENVIRONMENTAL PROTECTION AGENCY

MAES terrestrial and freshwaters ecosystem types EU-28



MAES Technical Report 2016-095 " Mapping and assessing the condition of Europe's ecosystems: Progress and challenges. 3rd Report – Final, March 2016)

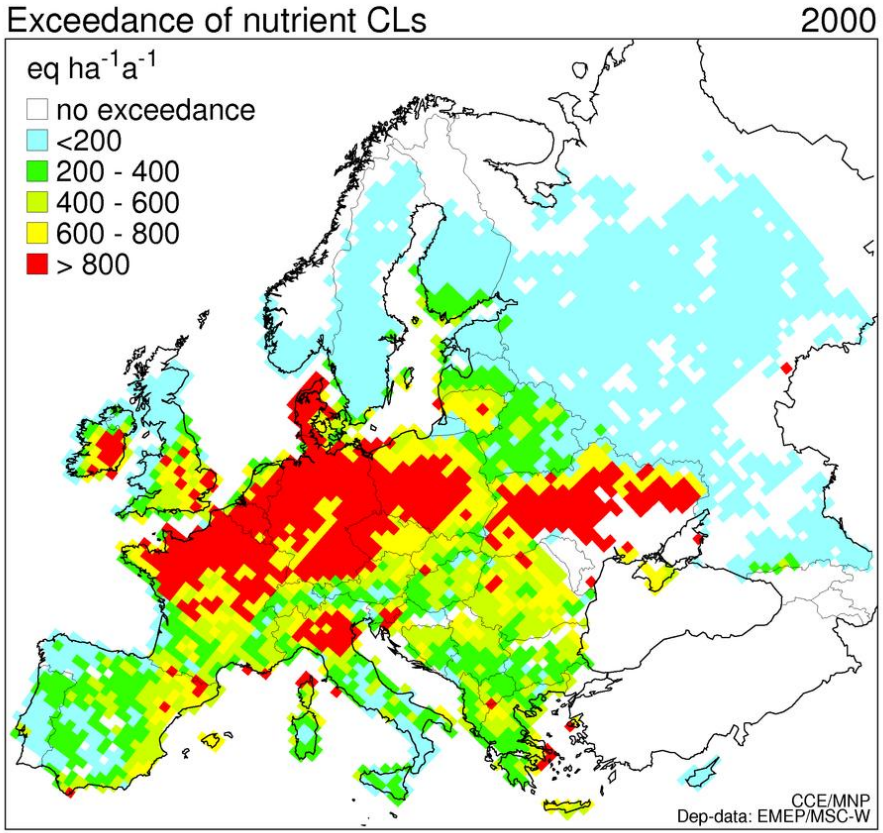
NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

Ecosystem monitoring under Article 9 and Annex V of Directive 2016/2284 (NECD)

Draft Guidance – Version 2

How and what to monitor?



wge Working Group on Effects of the Convention on Long-range Transboundary Air Pollution

(EU) 2016/2284

Table 2: Selected indicator complexes, parameters, and sources for methods from the ICP Forests Programme to cope with the NECD, Annex V; []: concentrations.

Measurement (Indicator complex)	Parameters	Frequency	Methods
Soil acidity in the soil solid phase	Element concentrations (base cations etc.) Ca, Mg, K, Na, Alex, Ntot and ratios C/N	Every 10-15 years at Level I and LevelII plots	Part X
Soil acidity in the soil solution	pH, [SOx], [NO3], [base cations (Ca, Mg, K, Na)], [Alex].	Every 4 weeks at Level II plots	Part XI
Soil nitrate leaching, in soil solution	[NO3+] at deepest soil layer (40-80 cm); to calculate fluxes a soil water flux model (water balance model) has to be applied.	Every 4 weeks at Level II plots	Part X, water balance model cf. Part IX
C/N ratio + total soil N, in soil solid phase	Cstock, Nstock, C/N ratio.	Every 10-15 years at Level I and Level II plots	Part X
Nutrient balance in foliage	[N], [P], [K], [Mg], and ratios with [N].	Every 2 yrs. at Level II, every 10-15 yrs. at Level I plots	Part XII

Measurement	Parameters	Frequency	Method	Data to be reported
Lake catchment sensitivity and hydrochemical effects of air pollution (acidification)	Alkalinity, sulphate, nitrate, chloride, pH, calcium, magnesium, sodium, potassium, dissolved organic carbon, and specific conductivity	Seasonal/quarterly to annual, depending on flush rate	Grab sampling of the upper layer (0,1-1 m) or lake outlet. Described in chapter 3.	Major ions (mg/l), nitrate (µg N/L), pH, DOC (mg C/l), alkalinity (µeq/L), conductivity at 25 °C (µS/cm)
River/stream catchment sensitivity and hydrochemical effects of air pollution (acidification)	Alkalinity, sulphate, nitrate, chloride, pH, calcium, magnesium, sodium, potassium, dissolved organic carbon, and specific conductivity	Monthly	Grab sampling. Described in chapter 3.	Major ions (mg/l), nitrate (µg N/L), pH, DOC (mg C/l), alkalinity (µeq/L), conductivity at 25 °C (µS/cm)

Table 5: Key indicators for assessing ozone damage to vegetation according to Annex 5 of the NECD.

Indicator	Measurement	Frequency	Reference for methodology and data reporting
Ozone foliar damage to trees	Visible ozone symptoms in leaves of tree species and on trees and wood plants at 'light exposed sampling sites' (LESS); Tree diameter growth.	Visible ozone symptoms: annually at Level II plots; Diameter growth: every 5 yrs.	Part VIII (visible ozone symptoms) and Part V (diameter growth) of ICP Forests Manual
Ozone foliar damage to crops and non-tree species	Visible ozone symptoms in leaves; Crops: harvested yield	Visible ozone symptoms: at least annually during growing season, preferably just after (3-7 days) an ozone episode[i]; Crop yield: annually	http://icpvegetation.ceh.ac.uk. To be revised from past manuals to suit NECD (including lists of ozone-sensitive species)
Exceedance of flux-based critical levels of ozone	Ozone concentration[ii], meteorology[iii] (temperature, relative humidity, light intensity, rainfall, wind speed, atmospheric pressure) and soil type (sandy, clay or loam) at or near site[iv]. Flux-based model DO_3SE can be used to calculate ozone flux and exceedance of critical levels	Every year: Hourly data during growing season[v]	Method in Modelling and Mapping Manual LRTAP Convention, Chapter 3 – 'Mapping critical levels for vegetation' (http://icpvegetation.ceh.ac.uk, including link to online version of the DO3SE model[vi]).

Measurement (Indicator complex)	Parameter	Frequency	Method
Meteorology	Precipitation, temperature of the air, soil temperature, relative humidity, wind velocity, wind direction, global radiation/net radiation	Monthly	Part 7.1
Air chemistry	sulphur dioxide, nitrogen dioxide, ozone, particulate sulphate, nitrates in aerosols and gaseous, nitric acid, ammonia and ammonium in aerosols	Monthly	Part 7.2
Precipitation chemistry (EMEP manual)	sulphate, nitrate, ammonium, chloride, sodium, potassium, calcium, magnesium and alkalinity	Monthly	Part 7.3
Throughfall	Sulphate, nitrate, ammonium, total N, chloride, sodium, potassium, calcium, magnesium, dissolved organic carbon and strong acid (by pH)	Weekly to monthly	Part 7.5
Soil chemistry	pH (CaCl2), S total, P total N total, Ca exchangeable, Mg exchangeable. K exchangeable, Na exchangeable, Al exchangeable, TOC, exchangeable titrable acidity (H+Al)	Every fifth years	Part 7.7
Soil water chemistry	pH, Electrical conductivity, Alkalinity, Gran plot, N total, ammonium, nitrate, P total, Ca, Mg, K, Na, Aluminium total, Aluminium labile	Four times annually	Part 7.8
Runoff water chemistry	alkalinity, sulphate, nitrate, chloride, dissolved organic carbon, pH, calcium, magnesium, sodium, potassium, inorganic (labile) aluminium, total nitrogen, ammonium, stream water runoff, specific conductivity	Monthly	Part 7.10
Foliage chemistry	Ca, K, Mg, Na, N, P, S, Cu, Fe, Mn, Zn and TOC	Every fifth year	Part 7.12
Litterfall chemistry	Ca, K, Mg, Na, N, P, S, Cu, Fe, Mn, Zn and TOC	Annually	Part 7.13
Vegetation (intensive plot)	Ground, field, shrub and tree layer vegetation, specifically soil-growing vascular plants, bryophytes and lichens. Tree diameter, canopy structure,	Three year	Part 7.17
Trunk epiphytes	Lichen species growing on living tree trunks	Every fifth year	Part 7.20
Aerial green algae	number of branches , youngest shoot with algae thickest coating of algae per tree, number of annual	Annually	Part 7.21

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

What happens now?

- National expert group meeting took place 9th of April were reporting template was presented together with explanatory notes
- Many member states were positive to the ecosystem monitoring (big surprise!!!)
- Draft template has been accepted and reporting has to be done by 1st of july 2018
- Many references to monitoring methods by the ICPs, could fill many gaps!

NATUR VÅRDS VERKET

SWEDISH ENVIRONMENTAL PROTECTION AGENCY

Cont.

- 
-
-

wge Working Group on Effects of the Convention on Long-range Transboundary Air Pollution

Has your ministry been in contact with you as national focal centers and experts?

NECD ecosystem monitoring

1. Has your ministry been in contact with you as national focal centers and experts?

2. Have you been involved in the national design of the monitoring?

3. How has the country developed its national ecosystem monitoring program?

4. Share your experiences on what has happened and how we can get involved?