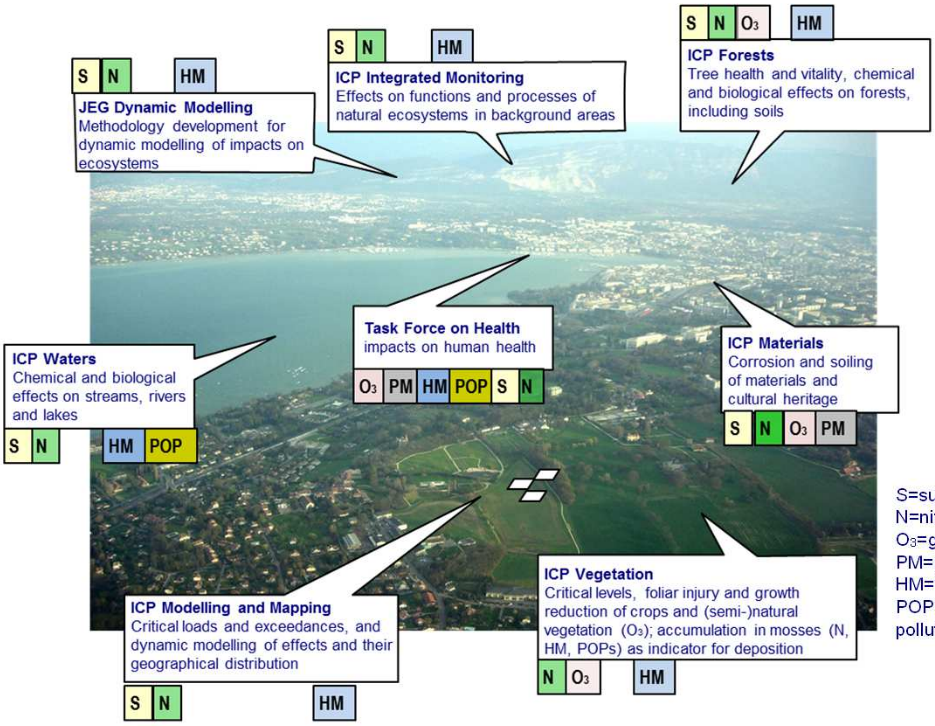
WORKING GROUP ON EFFECTS

CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

The Working Group on Effects provides information on the degree and geographic extent and development over time of the impacts of major air pollutants, such as sulphur and nitrogen, ozone, persistent organic pollutants, heavy metals and particulate matter, on the environment and human health.

Main work topics on the effect-oriented programmes



S=sulphur,
N=nitrogen,
O_3=ground-level ozone
PM=particulate matter
HM=heavy metals
POP=persistent organic pollutant

The work of WGE amounts to the world's largest facility of harmonized environmental monitoring of air pollution effects. It studies air pollution effects in the pan-European area and North America based on international cooperation on research, monitoring and modelling.

It manages six International Cooperative Programmes (ICP), a Joint Expert Group on Dynamic Modeling (JEG) and a joint Task Force on Health with the World Health Organization (WHO). For selected air pollutants they carry out:

- Long-term monitoring of ecosystems and materials at thousands of sites;
- Intensive monitoring for research and modelling at selected sites;
- Trend exposure programme for materials and case studies at cultural heritage sites;
- Assessment of relationships between pollutant load and impacts;
- Studies on modelling and mapping of critical loads and levels for acidification, eutrophication and ground-level ozone impacts;
- Evaluation of air pollution effects on human health.

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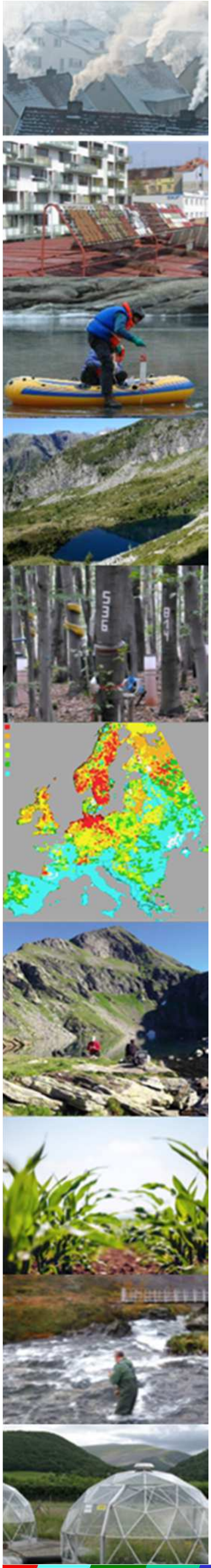

Mission and Goals

Monitoring

The long-term and extensive monitoring networks and data under the WGE are unique and are vital to detect the rate, the trend, the extent and intensity of changes of air pollution effects on ecosystems and materials.

It enables forecasting of potentially adverse effects, provides early warnings and helps to assess the effectiveness of air pollution policies.

Risk assessment by Modelling & Mapping

Critical loads and levels reflect the quantitative exposure to a pollutant below which significant harmful effects on sensitive elements of the environment do not occur. These effect-based values are estimated through modelling ecosystem response to deposition, based on site-specific ecological characteristics.

Areas at risk can easily be identified by comparing maps of critical loads (or levels) with those of the air pollutants load (or concentration) maps. Therefore, mapping exceedances of critical loads and levels identifies the geographical distribution and long-term trends of ecosystem vulnerability to air pollution.

Policy support

WGE provides infomation on policy-relevant user friendly indicators to evaluate air pollution effects on the environment and health.

Critical loads and levels remain an operational tool to help design national emission reduction requirements to protect nature. This effect-based approach was used for the 1994 Sulphur Protocol, for the 1999 Gothenburg Protocol and its revision in 2012.

In the European Union critical loads and levels have supported the National Emission Ceiling Directive of 2001 and its revision in 2016. They are also used in a conservation (Biodiversity Convention) and climate change context.

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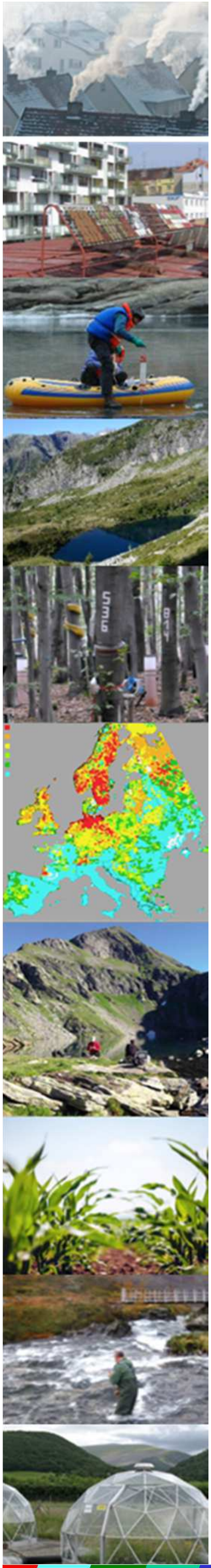

Key issues

Acidification: In acid-sensitive soils, lakes and streams in Europe and North America, sulphate concentrations have decreased on average 45-55% since 1988 as a result of a decrease in sulphate deposition. This has led to a widespread chemical and some, but slower, biological recovery of surface waters and soils. In 2020, critical loads in 4% of ecosystem areas are predicted to be exceeded. Still, full ecosystem recovery may not occur until long after non-exceedance.

Eutrophication through airborne nitrogen: About 58% of the European terrestrial ecosystem area will not be protected from eutrophication in 2020. Nitrogen pollution caused a decrease in sensitive plant species, lichens and fungi and very likely will negatively affect biodiversity in the future. Although nitrogen retention in ecosystem is still high, nitrate loss to the groundwater has risen.

Ozone damage: Human health and vegetation (including crops) remain currently at considerable risk of adverse impacts of ground-level ozone. Both, rising background ozone concentrations from intercontinental transport and local peak episodes of ozone adversely, affect human health and food production.

Heavy metals trends: Reductions in total deposition of Pb, Cd and Hg between 1990 and 2012 in Europe were 78%, 53% and 23%, respectively. Cd and Pb concentrations are progressively declining in the upper layers of soils (but increasing in the lower), while Hg concentrations are increasing in some sites. Exceedance of critical loads of mercury puts ecosystems at risk. There are still sites where mercury in freshwater fish exceeds WHO and WFD environmental quality standards.

Particulate matter: 7 % of the urban population in the EU-28 was exposed to levels above the EU limit value for PM2.5, and approximately 82 % was exposed to concentrations exceeding the stricter WHO AQG value for PM2.5 in 2015.

Materials: Corrosion of all materials has decreased substantially in Europe and roughly halved compared to values measured in 1987. These reductions are a result of decreasing levels of acidifying pollutants, mainly SO_2. Since the turn of the Century, however, the improvements are minor. The main challenge today is the effect of particulate matter, an important pollutant for both corrosion and soiling of materials.

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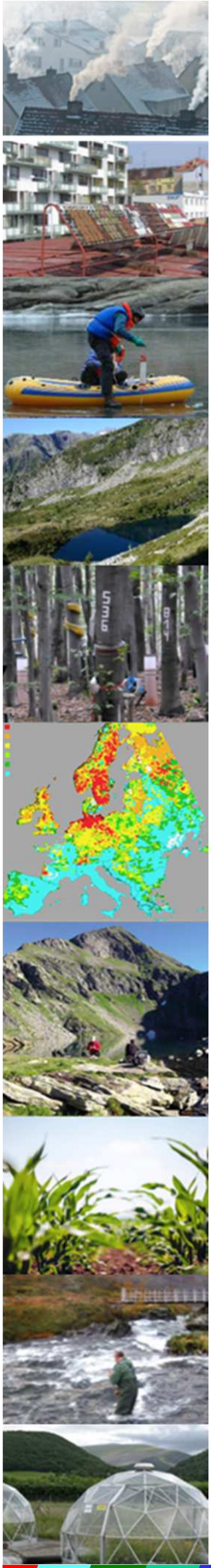

Participation and Reporting

The WGE meets annually to discuss the results of the international programmes and the current and future needs of the Convention. Parties to the Convention nominate National Focal Centres (NFC) for monitoring and modelling at country level. Currently, depending on the ICP, experts from 20 to 80 percent of the 51 Parties participate in annual meetings and regularly submit data.

Important results are brought to the attention of the Executive Body, published and disseminated to the public through the publication of reports, UNECE press releases and other means. Recent results are documented in the annual Joint Reports, technical reports and brochures (see ICPs webpages), as well as in the CLRTAP Assessment Report "Towards Cleaner Air" (2016) and the 2016 Trends Report (1).

(1) Trends in ecosystem and health responses to long-range transported atmospheric pollutants. (https://www.unece.org/environmental-policy/conventions/envlrtapwelcome/publications.html)

Working Group on Effects

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ICP Modelling and Mapping : http://www.icpmapping.org
ICP Materials: http://www.corr-institute.se/icp-materials/web/page.aspx
ICP Vegetation: http://icpvegetation.ceh.ac.uk
ICP Forests: http://icp-forests.net
ICP Waters: http://www.icp-waters.no
ICP Integrated Monitoring: http://www.syke.fi/nature/icpim
TF Health: http://www.euro.who.int/en/health-topics/environment-and-health/air-quality/activities/health-aspects-of-long-range-transboundary-air-pollution

Secretariat to the Convention:
United Nations Economic Commission for Europe
Email: air.env@unece.org,
www.unece.org/env/lrtap/welcome.html

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

July, 2018

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