



Soil Protection Working Group

## Questionnaire permanent monitoring sites for international monitoring mechanisms

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Soil Protection Working Group

## **Questionnaire on permanent monitoring sites for international monitoring mechanisms**

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**AT**

### **1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)**

The International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) was launched in 1985 under the Convention on Long-range Transboundary Air Pollution (Air Convention, formerly CLRTAP) of the United Nations Economic Commission for Europe (UNECE). ICP Forests monitors forest condition in Europe at two monitoring intensity levels:

The Level I monitoring is based on around 6000 observation plots on a systematic transnational grid of 16 x 16 km throughout Europe and beyond to gain insight into the geographic and temporal variations in forest condition.

The Level II intensive monitoring comprises around 500 plots in selected forest ecosystems with the aim to clarify cause-effect relationships.

At present 42 countries in Europe and beyond participate in ICP Forests.

Homepage: <http://icp-forests.net/>

#### **1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Bundesforschungszentrum für Wald (Austrian Research Centre for Forests)  
<https://bfw.ac.at/rz/bfwcms.web?dok=1004043> (implementation, scientific evaluation);

BMLRT (Policy)

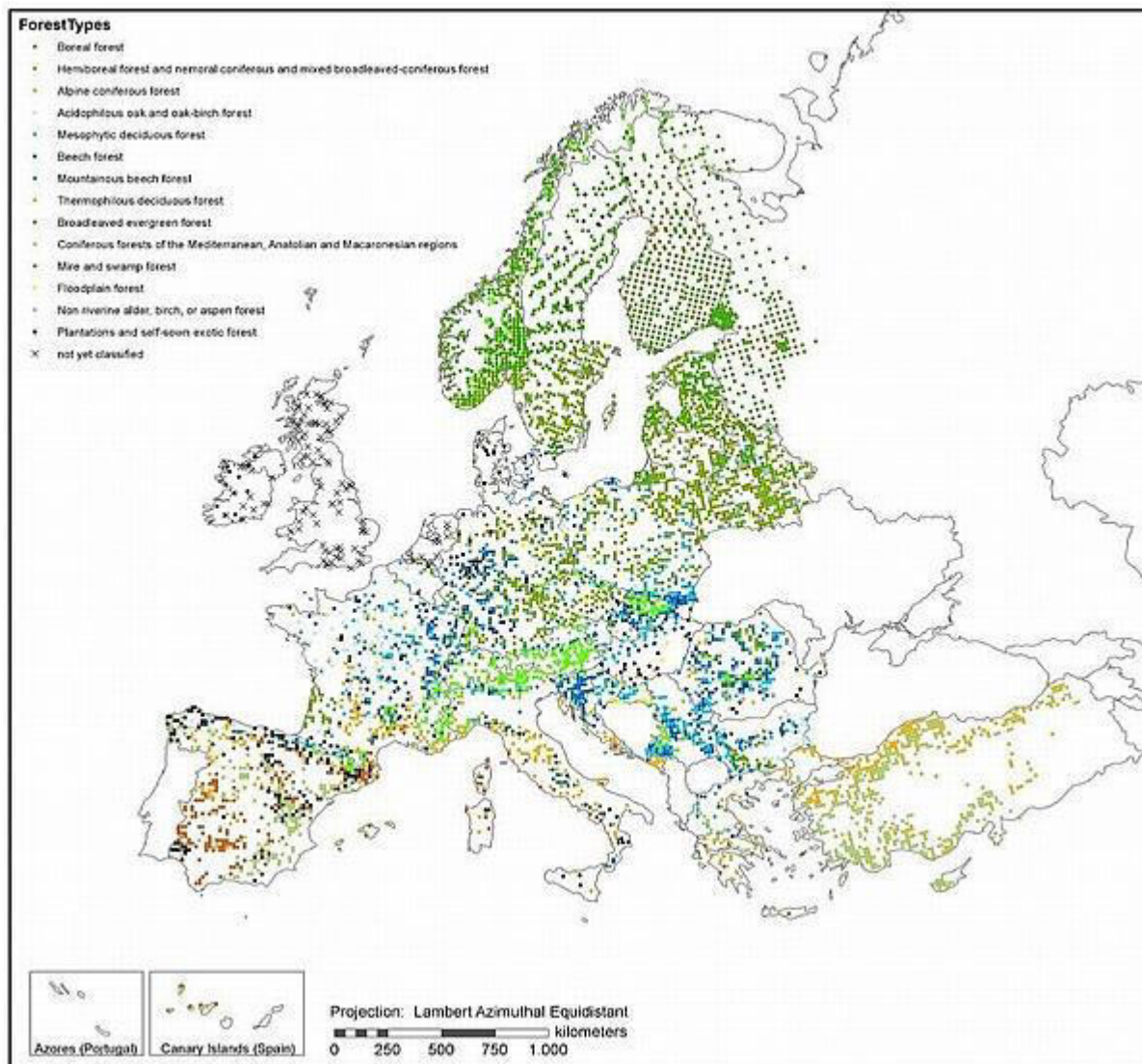
## 1.2 Level I monitoring sites

At Austrian level I plots two soil surveys were done (1987-1990, WBZI; 2006-2007 BioSoil Project of EU). Further information: <https://op.europa.eu/en/publication-detail/-/publication/f61a8e54-5099-466b-90ce-e62a317fba4f/language-en>

Plot	Number	Location Name	a.s.l. [m]	projection	easting	northing
101	703	Mattersburg	580	BMN M34	752000	284000
102	704	Rettenbach	520	BMN M34	742000	254000
201	701	Sirnitz Tschiggerhoehe	1180	BMN M31	509000	186000
201	705	Brenteralm	1680	BMN M31	493000	181000
202	704	Strassburg	1160	BMN M31	523000	200000
202	705	Zeltschach	1490	BMN M31	539000	206000
202	706	Metnitz	1260	BMN M31	512000	206000
204	750	Linsendorf	422	BMN M31	537000	159000
205	703	Lölling/ Klippitztörl	1380	BMN M31	550000	200000
205	705	Glantschach	990	BMN M31	520000	181000
206	707	Trebesing	1130	BMN M31	460000	197000
206	709	Kremsbruecke	1570	BMN M31	476000	203000
206	712	Obervellach	1540	BMN M31	432000	197000
206	713	Napplach	1100	BMN M31	443000	192000
207	705	Paternion	1600	BMN M31	460000	170000
207	710	Treffen	1090	BMN M31	487000	170000
208	702	St.Kollmann	550	BMN M31	559000	175000
208	704	Pribelsdorf	460	BMN M31	553000	164000
208	705	Globasnitz	800	BMN M31	556000	156000
301	704	Grosshollenstein	770	BMN M31	556000	294000
301	750	Sattlerhuetten	440	BMN M31	559000	313000
302	702	Hernstein	420	BMN M34	736000	306000
307	703	Kleinzell	550	BMN M34	706000	316000
307	710	St. Aegy	750	BMN M34	692000	302000
307	711	Horasek (Ramsau)	650	BMN M34	715000	318000
308	702	Aschelberg	860	BMN M34	667000	359000
310	704	Warth	500	BMN M34	735000	279000
310	707	Schwarzau Im Gebirge/ Rax Puchberg Am	1560	BMN M34	705000	288000
310	709	Schneeberg	1400	BMN M34	714000	291000
310	710	Aspang-Markt	600	BMN M34	729000	268000
311	703	Kirchberg/ Pielach	660	BMN M34	687000	320000
311	705	Probstwald	370	BMN M34	702000	332000
312	702	Mitterau\Gaming	820	BMN M34	654000	310000
312	704	Gresten	430	BMN M34	651000	318000
312	707	Neuhaus	1050	BMN M34	659000	293000
314	701	Waidmannsfeld	780	BMN M34	719000	302000
315	701	Stangau	510	BMN M34	729000	331000
315	704	Breitenfurt	400	BMN M34	737000	334000
315	705	Gablitz	420	BMN M34	735000	342000

403	708	Oberlangbath	840	BMN M31	482000	296000
403	710	Rettenbach	1260	BMN M31	476000	286000
404	701	Steyrling	870	BMN M31	501000	294000
404	702	Steyrling	680	BMN M31	509000	296000
410	703	Lumpelgraben	640	BMN M31	537000	297000
410	712	Grossraming	540	BMN M31	542000	307000
410	713	Kleinreifling	480	BMN M31	548000	291000
412	703	Mondsee	860	BMN M31	451000	305000
501	703	Abtenau	900	BMN M31	454000	269000
501	704	Russbach	1120	BMN M31	462000	272000
502	701	Weissenbach	880	BMN M31	460000	280000
502	707	Schwaighofen	680	BMN M31	435000	298000
503	704	Hoech	1340	BMN M31	451000	250000
503	706	Neuberg	1590	BMN M31	460000	252000
504	701	Ramingstein	1380	BMN M31	490000	217000
504	704	Muhr	1610	BMN M31	462000	217000
504	750	Mauterndorf	1095	BMN M31	479000	222000
505	702	Saalbach	1200	BMN M31	396000	250000
505	703	Bucheben	1340	BMN M31	424000	222000
505	707	Pichl	1290	BMN M31	410000	236000
505	708	Walchen	1420	BMN M31	399000	241000
505	710	Muehlbach	1450	BMN M31	372000	241000
505	716	Dienten	1490	BMN M31	424000	250000
601	704	Halltal	1300	BMN M34	686000	292000
601	706	Frauenberg	980	BMN M34	679000	254000
601	709	Bruck an der Mur	600	BMN M34	671000	251000
601	711	Foelz	880	BMN M34	666000	268000
601	713	Aschbach	900	BMN M34	669000	287000
602	702	Krumbach	960	BMN M34	657000	174000
604	703	Fressnitz	680	BMN M34	678000	226000
604	708	Laufnitzdorf	670	BMN M34	673000	243000
604	709	Rein	610	BMN M34	670000	224000
606	701	Lavantegg	890	BMN M31	556000	211000
606	705	Unterzeiring	1100	BMN M31	540000	233000
606	709	Pusterwald	1760	BMN M31	526000	247000
606	711	Moederbrugg	1210	BMN M31	537000	241000
609	702	Nicklasdorfgraben	960	BMN M34	662000	249000
609	706	Kraubathgraben	860	BMN M34	646000	244000
609	708	Schattenberg	1100	BMN M31	559000	258000
610	707	Landl	910	BMN M31	561000	277000
610	709	Lassing	1490	BMN M31	520000	263000
610	712	Unterhall	840	BMN M31	534000	277000
610	714	Weng	1100	BMN M31	542000	280000
611	701	Krieglach	720	BMN M34	693000	267000
612	702	Sanktmarein	1350	BMN M31	528000	211000
612	703	Oberwoelz	1330	BMN M31	523000	228000
612	704	Murau	1540	BMN M31	509000	214000
612	705	Rinegg	1460	BMN M31	515000	225000
613	702	Erlsberg	1570	BMN M31	512000	260000

613	703	Donnersbachwald	1460	BMN M31	506000	250000
613	711	Pichl	1510	BMN M31	471000	247000
613	712	Bad Mitterndorf 1	1280	BMN M31	493000	263000
613	714	Bad Mitterndorf 2	1340	BMN M31	498000	274000
614	704	Oswaldgraben	1180	BMN M34	650000	227000
614	706	Pack	960	BMN M34	647000	208000
615	701	Kathrein	730	BMN M34	692000	239000
615	705	Kaltenegg	1220	BMN M34	712000	263000
615	706	Fischbach	1380	BMN M34	696000	258000
702	703	Arzl	1490	BMN M28	183000	227000
704	702	Brixen	1120	BMN M31	366000	258000
705	703	Erl	1045	BMN M31	366000	285000
707	704	Pfaller	1300	BMN M28	169000	240000
		St.Veit Im				
709	703	Defreggental	2080	BMN M31	385000	200000
710	701	Reutte	890	BMN M28	179000	263000
711	702	Kaunertal	1650	BMN M28	181000	208000
712	750	Fieberbrunn	1475	BMN M31	385000	255000
713	702	Gallzein	1630	BMN M28	260000	247000
713	703	Plumbsbachtal	1500	BMN M28	245000	260000
713	704	Steinberg	1190	BMN M28	262000	266000
714	701	Obertilliach	1650	BMN M31	394000	175000
717	704	Zirl	940	BMN M28	216000	240000
801	702	Nenzing	1160	BMN M28	101000	224000
801	703	Nueziders	810	BMN M28	109000	227000
802	702	Au	1150	BMN M28	122000	242000
804	701	Fraxern	1420	BMN M28	103000	243000



Currently, due to access restrictions to the office, only this map is available.

### 1.3 Level II monitoring sites

Bundesforschungszentrum für Wald (Austrian Research Centre for Forests)

<https://bfw.ac.at/rz/bfwcms.web?dok=1004043>

BMLRT (Policy)

Further information: <https://bfw.ac.at/rz/bfwcms.web?dok=881>

Monitoring programme, core sites

Tree Crown Condition Assessment	1995	annual
Measurements of Tree Growth	1995	Every 5 years
Chemical Needle/Lea Analysis	1995	annual
Assessment of Ground Vegetation	1996	Every 5 years

Soil Analysis (Chemical and Physical Parameters)	1996	Every 10 years
Quantitative and Chemical Analysis of Wet Precipitation	1996	Every 14 days
Measurements of Air quality (passive Sampling)	2009	Every 14 days till 2011
Litterfall, chemical analysis of litter	2009	annual
Phänologie - Beobachtung der Vegetationsentwicklung	2009	Every 14 days
Leaf Area Index	2009	annual
Chemical Analysis of Soil Water	2010	Every 14 days
Analysis on nutrients in ground vegetation	2009	singular
Measurement of soil temperature and soil moisture	2009	every 15 Minutes
Meteorological measurements	2009	Every 15 Minutes
Automated dendrometer measurements	2009	hourly

#### Monitoring programme, regular sites

Tree Crown Condition Assessment	1995	annual
Measurements of Tree Growth	1995	Every 5 years
Chemical Needle/Lea Analysis	1995	annual
Assessment of Ground Vegetation	1996	Every 5 years
Soil Analysis (Chemical and Physical Parameters)	1996	Every 10 years
Quantitative and Chemical Analysis of Wet Precipitation	1996	Every 14 days

In bold letters: Core plots, regular letters: regular sites

PlotNbr	Location	a.s.l. [m]	projection	Easting	Northing	Main Tree Species
<b>09</b>	<b>Klausen-Leopoldsdorf</b>	<b>510</b>	<b>BMN34</b>	<b>729000</b>	<b>331000</b>	<b>Beech</b>
<b>11</b>	<b>Mondsee</b>	<b>860</b>	<b>BMN31</b>	<b>451000</b>	<b>305000</b>	<b>Spruce</b>
<b>15</b>	<b>Mürzzuschlag</b>	<b>715</b>	<b>BMN34</b>	<b>699000</b>	<b>277000</b>	<b>Spruce</b>
<b>16</b>	<b>Murau</b>	<b>1540</b>	<b>BMN31</b>	<b>509000</b>	<b>214000</b>	<b>Spruce</b>
<b>17</b>	<b>Jochberg</b>	<b>1050</b>	<b>BMN31</b>	<b>380000</b>	<b>244000</b>	<b>Spruce</b>
3	Brückl	930	BMN31	539000	178000	Spruce
5	Fresach	720	BMN31	476000	175000	Spruce
7	Grimmenstein	500	BMN34	735000	279000	Beech
12	Lungötz	920	BMN31	457000	261000	Spruce
13	Leutschach	670	BMN34	687000	165000	Fir
14	Niklasdorf	960	BMN34	662000	249000	Spruce
19	Zillertal	1490	BMN31	341000	250000	Spruce
20	Hochhäderich	1350	BMN28	124000	261000	Spruce



## 2. NEC Directive (National Emission Ceilings Directive)

Both Directive 2001/81/EC (the “old NEC-Directive”) and Directive (EU) 2016/2284 (“NEC-Directive”) have the aim to improve not only human health but also the condition of ecosystems across the EU. The Clean Air Programme for Europe includes, in addition to its target for reduction of health impacts across the Union, a target for a reduction by 35 % of the ecosystem area subjected to eutrophication by 2030, compared with 2005. In order to have the data to assess this target, member states report monitoring data in a 4-year interval, starting with 2019. The Austrian reporting regarding ecosystem monitoring under the NEC directive follows the respective guideline (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:C:2019:092:TOC>).

### 2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

Umweltbundesamt GmbH, [www.umweltbundesamt.at](http://www.umweltbundesamt.at)

### 2.2 Monitoring sites

The Austrian monitoring sites, which are existing ICP Forests, ICP Integrated Monitoring (both CLRTAP) or WFD sites, are located in the alpine and continental biogeographic region. As such, they represent both, the mountainous situation of the Alps as well as lowland areas. The site network is located in areas exposed to high and low deposition. Please note that S deposition has very similar distribution patterns in Austria as has N deposition shown in. The terrestrial forest sites include



the main Austrian tree species (*Picea abies*, *Fagus sylvatica*, *Quercus sp.*) and soils on siliceous as well as carbonate bedrock. All terrestrial sites are also part of the Austrian LTER network. Non-forest habitats are not yet included but possibilities to do so are explored in the moment. All freshwater sites are epirhithral and metarhithral, oligo- to mesotrophic streams with a nivale or a mixed nival-pluvial runoff regime.

Those sites located within the perimeter of the Alpine Convention are listed in Table 1 (15 sites out of a total of 17 NEC monitoring sites). The reported data is freely available at the EIONET portal: <https://www.eionet.europa.eu/>.

Table 1. Austrian NEC directive monitoring sites located within the perimeter of the Alpine Convention

Site code national	Site name	Longitude	Latitude	Ecosystem type (MAES classification)
ICP_FO_AU09	Klausen-Leopoldsdorf	16.05	48.12	Woodland and forest
ICP_FO_AU11	Mondsee	13.35	47.88	Woodland and forest
ICP_FO_AU15	Mürzzuschlag	15.66	47.63	Woodland and forest
ICP_FO_AU16	Murau	14.11	47.06	Woodland and forest
ICP_FO_AU17	Jochberg	12.41	47.33	Woodland and forest
LTER_EU_AT_003_551	Zöbelgraben	14.4441	47.8422	Rivers and lakes
LTER_EU_AT_003_IP2	Zöbelboden IP2	14.4441	47.8422	Woodland and forest
LTER_EU_AT_003_IP3	Zöbelboden IP3	14.4441	47.8422	Woodland and forest
FW21553436	Innere Wimitz	14.3078684	46.83515	Rivers and lakes
FW30900167	Vordere Tormäuer	15.2030805	47.91275	Rivers and lakes
FW40823016	Großer Bach oh. Anzenbach	14.4556134	47.84903	Rivers and lakes
FW51121257	Fuscherache bei Piffmoos	12.7974613	47.1395	Rivers and lakes
FW60800357	Preszeny-Klause	15.1526525	47.65321	Rivers and lakes
FW71510307	Innervillgraten	12.3378991	46.83012	Rivers and lakes
FW72200807	Scharnitz	11.2859235	47.38018	Rivers and lakes
FW80411046	Frutz, Bad Laterns	9.7872548	47.25813	Rivers and lakes

### 3. LTER Sites (Long-Term Ecosystem Research in Europe)

The core of the European Research Infrastructure eLTER RI (European Long-Term Ecosystem, Critical Zone and Socio-ecological Research Infrastructure) will be ca. 250 selected sites covering all biogeographical zones in Europe, where biological, biogeochemical, hydrological and socio-ecological data will be collected - according to common standards - and analysed. The operators of the Austrian LTER sites, which are the pool of sites available for eLTER RI, came together under the umbrella of "LTER-Austria", LTER in Austria provides an excellent link between environmental research and environmental monitoring, which is reflected in the reciprocal and highly synergistic utilization of the sites in both sectors (e.g. UNECE ICP Forests). Further to this, there are close connections to inter- and transdisciplinary sustainability research, to applied research, and to questions of sustainable regional development (e.g. the socio-ecological research platforms "Tyrolian Alps" and "Eisenwurzten").

### **3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Umweltbundesamt GmbH, [www.umweltbundesamt.at](http://www.umweltbundesamt.at)

LTER Austria, [www.lter-austria.at](http://www.lter-austria.at)

### **3.2 Monitoring sites**

A comprehensive description and access to metadata for LTER Austria is available at <https://deims.org/network/d45c2690-dbef-4dbc-a742-26ea846edf28>

### **4. LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)**

For LULUCF there is no separate Monitoring established in Austria.



Soil Protection Working Group

## Questionnaire on permanent monitoring sites for international monitoring mechanisms

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FR

### 1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)

The French extensions of the European networks for forest monitoring are the systematic network for forest health monitoring (16 x 16 km) and the RENECOFOR network respectively put into place in 1988/89 and 1992. Today, 25-30 years later, they are still operational and the base of the ICP in France.

RENECOFOR: French National network for long-term monitoring of forest ecosystems.

#### 1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

Created in 1989, the Forest Health Department(DSF) is in charge of health monitoring of French forests in metropolitan France. To ensure the protection and quality of the forests, the DSF's network of foresters monitors the forests, diagnoses silvosanitary problems, and assists and advises managers and owners. It monitors the evolution and impact of forest pests and identifies any emerging problems. The DSF makes 10,000 silvosanitary observations per year. The DSF manages a monitoring, diagnostic and phytosanitary advisory system for the forest. It relies on a network of more than 230 field foresters known as correspondent observers who work in different organizations (ONF, CNPF or decentralized services of the French Agriculture Ministry).

<https://agriculture.gouv.fr/la-sante-des-forets>

French Forest National Office

[http://www1.onf.fr/renecofor/++oid++b6b/@@display\\_advise.html](http://www1.onf.fr/renecofor/++oid++b6b/@@display_advise.html)

French National Forest Inventory:

<https://inventaireforestier.ign.fr/spip.php?rubrique74>

## **1.2 Level I monitoring sites**

The sites are based on a 16 km x 16 km systematic grid for the French forest damage systematic monitoring, managed by the DSF

## **1.3 Level II monitoring sites**

Each observation site is 2 hectares in size and is referred to as a "plot". The network is intended to be representative of all major French forest types.

In total (France), the network is made up of 102 plots all located in public forest. Only 9 are located in the perimeter of the AC. The site description are available via the following link: <http://www1.onf.fr/renecofor/sommaire/sites>

## **2. NEC Directive (National Emission Ceilings Directive)**

At the national level, the main framework document for the fight against air pollution is the air pollution emission prevention plan (PREPA), provided for in Article L. 222-9 of the Environment Code since Law No. 2015-992 of 17 August 2015 relating to the energy transition for green growth<sup>25</sup>(\*).

Adopted in 2017, the PREPA consists of a decree setting the objectives for the reduction of anthropogenic pollutant emissions for the periods 2020-2024, 2025-2029 and from 2030<sup>26</sup>(\*), in line with the national objectives set in the aforementioned European "NEC" directive, and a decree determining the actions to be implemented or reinforced over the period 2017-2021, in order to effectively reduce these pollutant emissions.

PREPA's action program comprises 7 components, dedicated to the main emitting sectors as well as to certain cross-cutting themes: "industry", "transport and mobility", "residential-tertiary", "agriculture", "mobilization of local stakeholders", "improvement of knowledge and innovation", "sustainable financing for air quality". Each of these strands is broken down into several strands linked to different actions.

The PREPA must be reassessed every four years and updated within 18 months when the national emissions inventory or national emissions projections indicate that the objectives are not being met or suggest that they are likely to be missed.

### **2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Local and regional authorities (implementation)

Direction départementale des territoires (implementation and evaluation)

Regional Directorates for the Environment, Planning and Housing (implementation and evaluation)

## **2.2 Monitoring sites**

Impossible to be done due to the high number of sites.

## **3. LTER Sites (Long-Term Ecosystem Research in Europe)**

Briefly summarize the main content of the monitoring scheme (its aim and scope, links to policy objectives and other policy instruments, which parameters it focuses on, other key information you think is relevant to understand the monitoring scheme)

The monitoring scheme varies in each French LTER sites. The bases of the monitoring are depending on the objectives of each Workshop Zones that are basic components of the French LTER. See the WS descriptions below.

### **3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

In France, it is the "Network of Workshop Zones" built under the aegis of the CNRS (which is the LTER correspondent) and which is also intended to be a Long Term Observation and Experimental System for Environmental Research (SOERE), labelled by the National Research Alliance for the Environment (AllEnvi). This network of workshop zones plays the role of French representative of the international Long Term Ecological Network

NWZ: Network of Workshop Zones

In direct contact with the questions of managers, politicians and associations, they share with the American LTER (Long term ecological research) and the international network (ILTER) a conceptual framework highlighting the integrative and iterative processes of socio-ecological interactions. Their themes focus on resource dynamics (water, biodiversity, etc.), land use change, the effects of climate change and land management.

### **3.2 Monitoring sites**

All of the WZ (13 sites as of January 1, 2015) offer a diversity of contrasting situations from the point of view of environments and social systems. Each of these WZ corresponds to a geographical area on the scale of a territory characterised by a functional unit/ecosystem: watershed, agro-ecosystem, etc.

### **Rhône Basin Workshop Zone (ZABR)**

The ZABR addresses, through different disciplines, the interactions between the river and perfluvial environment of the Rhône and the societies that develop in the catchment area.

Geographical area: Rhone catchment area

Website: <http://www.zabr.org>

Contact: Pierre MARMONIER, UMR 5023 Laboratoire d'Ecologie des Hydrosystèmes naturels et anthropisés and Bernard MONTUELLE, UMR CAARTEL

### **Moselle Basin Workshop Zone (ZAM)**

The main objective of the ZAM is to acquire knowledge in order to help control the impact of human activities on the quality of water resources in Lorraine, in the Moselle catchment area.

Geographical area: Moselle catchment area

Website: <http://www.ensic.inpl-nancy.fr/Zam>

Contact: Emmanuelle MONTARGES-PELLETIER UMR 7360 Interdisciplinary Laboratory of Continental Environments , Marc BENOIT UR 55 ASTER , Jean-François MUNOZ, ANSES-Laboratoire d'Hydrologie de Nancy and Christophe MERLIN, UMR 7564 LCPME

### **Alps Workshop Zone (AWZ)**

The AWZ studies the coupled dynamics of alpine ecosystems, their uses and climate on two sites that are contrasted by their natural and human conditions: the Vercors and the Oisans.

Geographical area: Alps (Vercors and Oisans)

Website: <http://www.za-alpes.org>

Contact: Philippe CHOLER, UMR 5553 Laboratoire d'écologie alpine (LECA) and Thomas SPIEGELBERGER, INRAE UR LESSEM

### **Urban Environmental Workshop Zone Strasbourg (ZAEU)**

The ZAEU is an environmental observation system for urban areas in conjunction with local authorities, carrying out actions to structure research on complex issues related to natural processes and social dynamics.

Geographical area: Alsace (Bas-Rhin)

Contact: Christiane WEBER, ERL 7230 LIVE

Zone Atelier Arc Jurassien (ZAAJ)

### **Jura Arc Workshop Zone (ZAAJ)**

The ZAAJ federates a research network on the interactions between environment, society and the dynamics of the socio-ecological systems of the Jura arc. It is particularly interested in the impacts of past and present changes in climate and landscape on populations and communities, and the relationships between environment, ecology and health.

Geographical area: Jura Arc

Website: <http://zaaj.univ-fcomte.fr>

Contact : Patrick GIRAUDOUX, UMR 6249 Chrono-environnement

## **4. LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)**

National plans implemented within the framework of agro-ecological policies

- Agroecological project (diversification of crop rotation, agroforestry, tillage, reduction of mineral fertilization, etc.)
- Organic Ambition Programme, support for organic farming (direct impact LULUCF limited, but mitigation of global emissions from the sector).
- Plant protein plan, development of plant crops rich in plant protein (direct impact LULUCF limited, but mitigation of global emissions from the agricultural sector)
- Provisions for controlling soil artificialisation (ALUR and LAAF laws): preservation of agricultural soils and of the storage potential for carbon
- Agroforestry development plan

National plans implemented within the framework of forest and forestry policies :  
Most of the policies and measures implemented and programmed for the forest-based sector have combined effects on several levers, the most important ones:

- increase the substitution of energy-intensive products by wood or wood-based products
- accentuate the substitution of fossil fuels by wood energy
- improve the production potential of the upstream forestry sector to enable it to meet the increased demand for wood.
- promote the storage of carbon in wood products, by encouraging their reuse
- increase the productive capacity of the forest and its function as a "carbon pump"
- support and develop intangible investments (studies, research)

Strategic advances are expected from the world of research to develop economic tools that will enable:

- account for and value the environmental and social services provided by agriculture and forestry,
- to take better account of the carbon content of agricultural/forest production (through life cycle analyses, in particular),
- respond to the complexity of measuring emissions (given the many biological and cultural phenomena involved),
- and to meet the need for inventories and appropriate monitoring systems.

#### **4.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

French Environment Ministry and French Agriculture Ministry.

Citepa contributes to the fight against atmospheric pollution and climate change by calculating, interpreting and disseminating information on reliable emission data for decision-makers and specialists in France and abroad. As a non-profit organisation and State operator for the French Environment Ministry, the Citepa meets reporting requirements for air pollutants and greenhouse gas emissions from France in different inventory formats, such as UNFCCC, EMEP, Kyoto Protocol and UNECE inventories. Our inventory reports contribute to the transparency of the effects of climate and air quality policies and measures on emissions, and assist public decision-making. It strengthens the capacities of French or foreign States, regions, cities and companies to develop and report their efforts in terms of greenhouse gas emissions and air pollutants, as well as adaptation to climate change.

<https://www.citepa.org/en/data/>

The French National Geographic Institute contributes to the LULUCF as an operator of the French Agriculture Ministry, more precisely on the forestry topics (the NGI includes the Forest National Inventory).

#### **4.2 Monitoring sites**

They are no real monitoring site. The LULUCF evaluation is based on the use of the Forest National Inventory (without permanent plots), of the data of agricultural statistics department, and of all the available data dealing with this thematic (e.g. Air pollution sensor disseminated along roads and in the cities).





Soil Protection Working Group

## Questionnaire on permanent monitoring sites for international monitoring mechanisms

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**DE**

### 1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)

Concept, scheme, parameters and metadata as well as data requests see:

[ICP Forests](#)

All countries in the alpine region participate

#### 1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

**International:**

UN/ECE-ICP Forests (intern.): [ICP Forests](#)

*ICP-Data Service:* [Thünen-Institut: ICP Forests](#)

**National:**

BMELF (NFC of ICP Forests, Germany): [BMEL - Das forstliche Umweltmonitoring](#)

*National Data Service:*

[Thünen-Institut: ICP Forests](#)

[Thünen-Institut: Bodenschutz und Waldzustand](#)

**Federal:**

[Klima- und Ressourcenschutz in Bayern - StMELF](#)

*Federal Data Service -Implementation and Monitoring (Bavarian State Institute of  
Forestry, Department 2 Soil and Climate):*

Umweltmonitoring

Bodeninventur und Bodendauerbeobachtung

## 1.2 Level I monitoring sites

### International:

ICP Forests: see 1.1

### EU:

Periodical assessment of forest soils 16x16 km grid according to ICP Forests: (first soil survey (Biosoil), under Forest Focus Convention (EU); no repetition up to now.

<https://publications.jrc.ec.europa.eu/repository/bitstream/111111111/15905/1/lbna24729enc.pdf>

### *Data and Metadata:*

Validated soil data and metadata provided to the JRC are integrated into the Soil Profile Analytical Data Base of Europe, which is part of the European Soil Data Centre.

<https://data.europa.eu/euodp/en/home>

<https://esdac.jrc.ec.europa.eu/>

### National:

Level I is a subsample of National Soil Inventory (BZE) 8x8 km grid. Third soil inventory in preparation 2022-2024

*Data and Metadata, Maps: see 1.1*

### Federal:

Level I is a subsample of National Soil Inventory (BZE) 8x8 km grid. Third soil inventory in preparation 2022-2024

*Data and Metadata, Maps: see 1.1*

## 1.3 Level II (?) monitoring sites

Responsability and data of all regional scales see: 1.1

## 2. NEC Directive (National Emission Ceilings Directive)

### National:

Implementation BMU, Umweltbundesamt

[Nationales Luftreinhalteprogramm der Bundesrepublik Deutschland 2019 | Umweltbundesamt](#)

Monitoring data are used for national reporting obligations see 1.1

### 2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

See 1.1

### 2.2 Monitoring sites

see 1.2 and 1.3

## 3. LTER Sites (Long-Term Ecosystem Research in Europe)

### International:

[Sites & platforms — LTER in Europe](#)

Initiative to connect monitoring sites, still in progress. Some ICP Forests Level II Sites are just integrated.

### 3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

Subset of Forest Monitoring Level II:

See national and federal responsibility 1.1

BMEL (Germany), LWF (Bavaria- not yet included)

### 3.2 Monitoring sites

No Federal site integrated till now.

## 4. LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)

No Information



Soil Protection Working Group

## **Questionnaire on permanent monitoring sites for international monitoring mechanisms**

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### **1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)**

#### **IT – ICP Forest Programme - CON.ECO.FOR. (Controllo ecosistemi forestali)**

Italy actively participates in the implementation of the ICP Forest Programme since its inception through the activation on its territory of the large-scale Level I monitoring programme and with the intensive and continuous Level II monitoring programme of forest ecosystems.

In particular, the Level II network, based on the intensive monitoring areas where most research takes place, is used to understand the interaction between air pollution, climate change and forest ecosystems. These monitoring areas are representative of the main Italian forest types (beech forest, spruce forest, Turkey oak forest, holm oak forest, plain forests, etc.), of which 24 are located in Italian mountain territory, among 700 and 1900 m altitude, and of these 10 fall within the perimeter of the Alpine Convention.

This monitoring programme is implemented within the CON.ECO.FOR network (National Network for the Control of Forest Ecosystems), established since 1995.

The detection and monitoring of natural phenomena related to the forest ecosystem are, by law, under the jurisdiction of the Carabinieri Corp (d.lgs 177/2016).

#### **1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

The institution responsible of the forest monitoring national programme is Carabinieri Corp, Forestry specialty since 2016.

The field work for both networks –Level I and Level II - is carried out in the Regions with ordinary statute by CON.ECO.FOR qualified detectors of the Carabinieri Corp - Forestry specialty and, in the Autonomous Provinces and Regions, by surveyors of the Regional/Provincial Forest Corps. The data and information collected are transmitted and processed by a team of researchers from the main national research centers in the forestry sector: the National Research Center (Centro Nazionale delle Ricerche - CNR); the Universities of Florence and Camerino; the Council for Agricultural Research and Analysis of the Agricultural Economy (Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - CREA).

The data processed by the monitoring activities are integrated into the European databases of the ICP-Forest and ICP-IM programmes of which the Studies and Projects Office of the Carabinieri Command for the Protection of Biodiversity and Parks (CUFA - Command for Forestry, Environmental and Agri-food Units) is *National Focal Center* for Italy.

(<https://www.carabinieri.it/arma/oggi/organizzazione/organizzazione-per-la-tutela-forestale-ambientale-e-agroalimentare>).

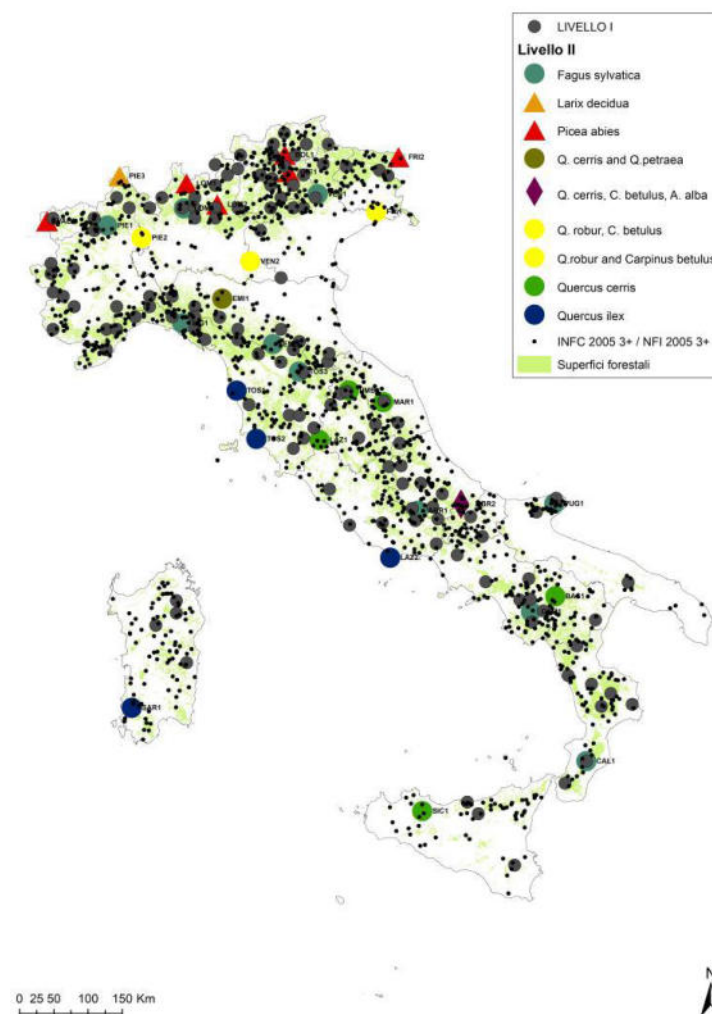
## References

Papitto G., Cindolo C., Cocciufa C., Brunialti G., Frati L., Pollastrini M., Bussotti F. (a cura di), 2018. Lo stato di salute delle foreste italiane (1997 – 2017). 20 anni di monitoraggio della condizione delle chiome degli alberi. Pubblicato da Arma dei Carabinieri, Comando Unità Forestali Ambientali e Agroalimentari. Roma. Pag.205

Life+ SMART4Action – Sustainable Monitoring And Reporting To Inform Forest and Environmental Awareness and Protection. Life 13ENV/IT/000813, Final Report (2018).

## 1.2 Level I monitoring sites

Level I of the monitoring national network is made up of about 260 sites distributed on the national territory on the basis of a 15 x 18 km grid used as an early warning system for damage to the forest heritage. For distribution of level I monitoring sites, see the attached map.



From Life+ SMART4ACTION – Final Report 31/12/2018

## 1.3 Level II monitoring sites

Level II monitoring sites is composed by 31 square permanent areas, 50 m on each side, within the main types of forest ecosystems. At test areas, chemical-physical and biological measurements are carried out to study the health status of the woods through the analysis of: biodiversity, chemical composition of the leaves, tree growth, crown conditions, air composition, precipitation and liquids present in the soil. The Level II monitoring sites included in the Italian perimeter of the Alpine Convention are 10, as can be seen in the attached map.

At the end of 2018, the Life+ project Smart4Action (Sustainable Monitoring And Reporting To Inform Forest and Environmental Awareness and Protection) was completed. The project was coordinated by the Carabinieri Corps (CUFA) with support of the National Research Center, the University of Florence, the Council for Agricultural Research and Analysis of the Agricultural Economy (CREA). The project aimed at restructuring forest monitoring networks in order to reduce management costs, while continuing to guarantee the scientific correctness of the data collected. Furthermore, the project introduced citizens to sharing information on forests, through a "citizen-science" action. Therefore, at the end of the project some proposals were formulated to reduce the number of monitoring sites of both Level I and Level II or their sampling parameters.

The attached table shows a extract of the proposed reduction of the parameters to be monitored for the 10 monitoring sites of the Alpine Convention area formulated by Smart4Action Life Project at the end of 2018 . (TAB 1)

## 2. NEC Directive (National Emission Ceilings Directive)

### IT – NEC Network (Rete NEC)

**The information relating to the Italian NECD monitoring network was mostly taken from:**

De Marco A., Proietti C. et al., 2019. *Impacts of air pollution on human and ecosystem health, and implications for the National Emission Ceilings Directives: Insights from Italy*. Environmental International 125. 320-333. <https://doi.org/10.1016/j.envint.2019.01.064>

Papitto G., Cindolo C., Cocciufa C., Brunialti G., Frati L., Pollastrini M., Bussotti F. (a cura di), 2018. *Lo stato di salute delle foreste italiane (1997 – 2017). 20 anni di monitoraggio della condizione delle chiome degli alberi*. Pubblicato da Arma dei Carabinieri, Comando Unità Forestali Ambientali e Agroalimentari. Roma. Pag.205.

The NEC Directive entered into force on 31th December 2016 and was implemented in Italy with the Legislative Decree 30 May 2018, n. 81. The decree for the definition of the operational aspects of the Directive and especially for the implementation of ecosystem monitoring network was issued by the Ministry of the Environment and Protection of the Territory and the Sea on 26th November 2018.

It is therefore possible to carry out the obligations required by the Directive using the manuals of the LRTAP Convention, the parameters and indicators of the ICP Forests and therefore of the ICP Forests - CON.ECO.FOR areas. Level II.

Italy is therefore activating the NEC network to monitor the impacts of atmospheric pollutants on ecosystems (terrestrial and freshwaters); as far as forests are concerned, monitoring is based on 6 areas ICP Forests - CON.ECO.FOR. Level II.

## 2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

In Italy, the Ministry for Environment, Land and Sea – General Directorate for Waste and Pollution (Division on Air, noise and electromagnetic pollution), is responsible for the NECD enforcement and for setting a National Network to monitor air pollution impacts in collaboration with research institutions and local administrations.

CUFA (Carabinieri Corp - Command for Forestry, Environmental and Agri-food Units) was called by the Ministry of Environment to provide ICP Forests field infrastructures and monitor indicators requested by the Directive. An agreement with the Ministry of Environment was signed (on December 2018) to implement a NEC Network ITALY.

## 2.2 Monitoring sites

The monitoring sites of terrestrial ecosystems identified by the Ministerial Decree 26 november 2018 (*DM 26 novembre 2018, Siti e criteri per l'esecuzione del monitoraggio degli impatti dell'inquinamento atmosferico sugli ecosistemi*) and falling within the Italian perimeter of the Alpine Convention have been selected below.

<b>NECD Terrestrial Ecosystem Monitoring sites within the Italian perimeter of the Alpine Convention</b>				
<b>NEC Italian monitoring sites</b>	<b>INTERREG1</b>	<b>PIE1 (CON.ECO.FOR)</b>	<b>TRE1 (CON.ECO.FOR)</b>	<b>VEN1 (CON.ECO.FOR)</b>
<b>Categories of physical and chemical parameters to be monitored</b>	Demonte/ Valloriate	Val Sessera	Passo Lavazè	Pian di Cansiglio
<b>Solid phase</b>		<b>X</b>		<b>X</b>
<b>Liquid phase</b>		<b>X</b>		<b>X</b>
<b>Ozone and meteorology</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>

You can see the location of the sites identified by Ministerial Decree for the NEC Directive implementation in Italy in De Marco A., Proietti C. et al., 2019, fig. 6, page 329, where 4 forest sites and 4 freshwater sites are included in the Italian perimeter of the Alpine Convention.

“The monitoring network identified for Italy contains sites distributed over the territory and will produce a high number of monitored parameters. The numbers of sites selected is not high, but the parameters monitored are in strict agreement with the list provided by the NECD. In detail, four sites sensitive to both acidification and nitrogen deposition where long-term data are collected

(ICP Waters/LTER) were identified for water bodies monitoring, all of them located in the north alpine region, because this is considered a pristine area in Italy not affected by other anthropogenic sources of air pollution, where the contribution of transboundary air pollution can be distinguished from other pressures; 6 sites for terrestrial ecosystem monitoring (ICP Forests), for both liquid and solid phases monitoring, distributed on a north to south gradient (4 sites for a latitudinal transect of *Fagus sylvatica* and the other two sites in the Mediterranean area characterized by *Quercus petraea* and *Quercus cerris*); 11 sites for ozone and meteorology (LIFE/INTERREG/ICP Forests), distributed in consideration of the different biogeographic areas and habitat distribution (in addition of the species listed before for terrestrial ecosystem, three typical Mediterranean species: *Phyllirea latifolia*, *Pinus pinea* and *Quercus ilex*).” (De Marco A., Proietti C. et al., 2019).

### **3. LTER Sites (Long-Term Ecosystem Research in Europe)**

The vast majority of studies in the ecological literature last less than three years, and only 10% of studies capture unusual events. Through research and long-term observation of representative sites around the globe, Long-Term Ecosystem Research (LTER) enhances our understanding of the structure and functions of ecosystems, which provide essential services to people. In 1980, the United States National Science Foundation (NSF) initiated the US Long Term Ecological Research Network (US LTER) Network. The International Long Term Ecological Research Network (ILTER) was founded in 1993, to meet the growing need for global communication and collaboration among long-term ecological researchers and to capture ecological phenomena in the context of global change. LTER Europe (<https://www.lter-europe.net/lter-europe>) was launched in 2003 as the umbrella network for LTER in Europe. Its members are national networks operating a wide range of research and monitoring sites as well as larger platforms for socio-ecological research. Several permanent monitoring sites are located in the mountain regions, where several biotic (e.g. plant phenology, plant composition, soil microbial biomass) and abiotic factors (e.g. air temperature, soil temperature, snow cover duration) are recorded. LTER-Italy is one of the twenty-five national networks that make up the LTER-Europe Network (LTER-Europe; [www.lter-europe.net](http://www.lter-europe.net)) and it pertains to the LTER International Network (ILTER; [www.ilternet.edu/](http://www.ilternet.edu/)), globally distributed.

LTER-Italy is also one of the key nodes of the E-infrastructure for Biodiversity and Ecosystem Research LifeWatch (LifeWatchItaly; [www.servicecentrelifewatch.eu/home](http://www.servicecentrelifewatch.eu/home)).

#### **3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

LTER-Italy is one of the twenty-five national networks that make up the LTER-Europe Network (LTER-Europe; [www.lter-europe.net](http://www.lter-europe.net)) and it pertains to the LTER International Network (ILTER; [www.ilternet.edu/](http://www.ilternet.edu/)). Each network is separately governed through scientific institutions (e.g. Universities, National Research Councils), but, through their involvement in LTER-Europe, they strive to work together.

The bodies of LTER-Europe are: (information from: <https://www.lter-europe.net/lter-europe/about/organisation/formalisation-and-bodies>):

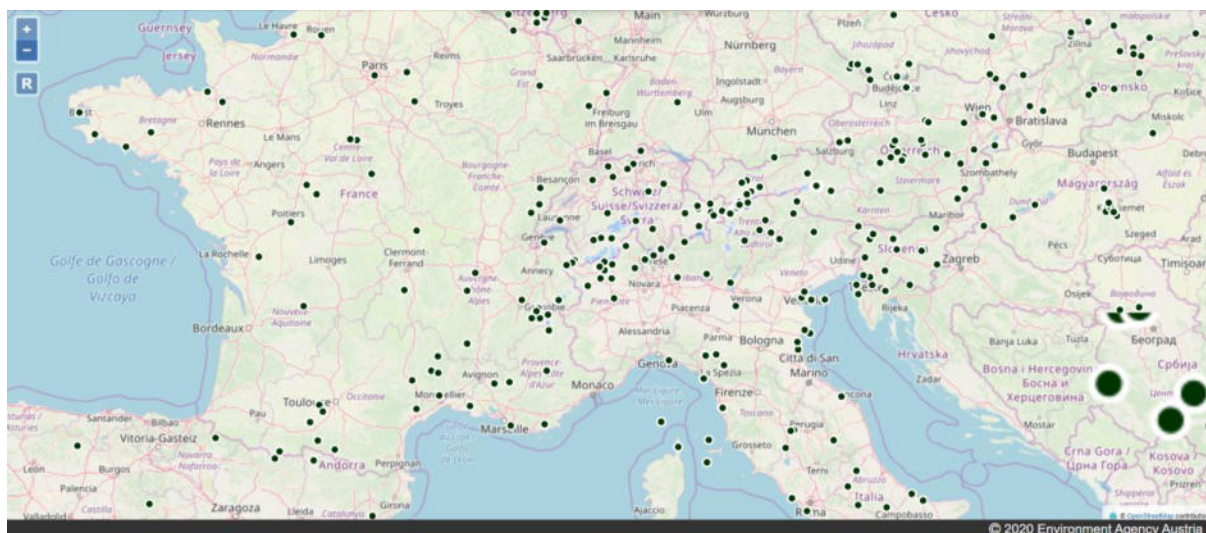


1. Chair and Vice-chair
2. Executive Committee (EC), consisting of chair, vice chair, expert panel leads
3. Co-ordinating Committee (CC), consisting of representatives of the formal national LTER networks
4. National Networks Representatives Conference (NNRC), consisting of representatives of formal and emerging national networks.
5. Scientific Site Co-ordinators Conference (SSCC), consisting of all scientific LTER Site co-ordinators and LTSER Platform managers
6. Expert panels (EP) on:
  - Science Strategy
  - Information Management
  - Long-Term Socio-Ecological Research Platforms
  - Site Management
  - Harmonization and Standardization
  - Communication
  - Technology

### **3.2 Monitoring sites**

DEIMS-SDR (Dynamic Ecological Information Management System - Site and dataset registry) is an LTER information management system that allows you to discover long-term ecosystem research sites around the globe, along with the data gathered at those sites and the people and networks associated with them. DEIMS-SDR describes a wide range of sites, providing a wealth of information, including each site's location, ecosystems, facilities, parameters measured and research themes. It is also possible to access a growing number of datasets and data products associated with the sites.

In the figure below a screenshot from the DEIMS web site shows the LTER research sites in Europe, with a focus on the Alpine Convention area. These sites include terrestrial and freshwater sites.



LTER Italy (<http://www.lteritalia.it/>), for example, included 25 macro-sites (Each macro-site, representative of terrestrial, freshwater and marine ecosystems, includes different research sites), among them 4 terrestrial macro-sites are located in the Alps, including 16 research sites. In the table below are reported the main characteristics of the 4 macro-sites and related research sites, with a focus on the soil parameters measured in the sites.

Macro-sites (parent sites)	Research sites	Location	Main Institutions	Main Soil Parameters
<b>IT 02 Foreste delle Alpi</b>	Renon BOL1	Provincia Autonoma Bolzano	CONECOFOR	Soil and soil solution chemistry
	Passo Lavazè TRE1	Provincia Autonoma Trento	CONECOFOR	Soil and soil solution chemistry
	Tarvisio FRI2	Friuli Venezia Giulia	CONECOFOR	Soil and soil solution chemistry
	Valbona	Provincia Autonoma Trento	Università di Torino	
	Val Masino LOM1	Lombardia	CONECOFOR	Soil and soil solution chemistry
<b>IT 19 Alpi Nord Occidentali</b>	Mosso	Piemonte/Valle d'Aosta	Università di Torino	Soil temperature, soil C and N cycling, paleosols
	Tronchaney	Valle d'Aosta	ARPA – Valle d'Aosta	Soil temperature, gas fluxes
	Tellinod	Valle d'Aosta	ARPA – Valle d'Aosta	Soil temperature, gas fluxes
	Mont Avic	Valle d'Aosta	ARPA – Valle d'Aosta	Soil temperature, organic matter mineralization rates
	Cime Bianche	Valle d'Aosta	ARPA – Valle d'Aosta	Soil temperature, organic matter mineralization rates
	Mont Mars	Valle d'Aosta	Università di Torino	Soil temperature, soil C and N cycling
<b>IT 23 Parco Nazionale Gran Paradiso</b>	Parco Nazionale Gran Paradiso	Piemonte/Valle d'Aosta	Parco Gran Paradiso, CNR	Soil forming processes, soil gas fluxes
<b>IT 25 Val di Mazia</b>	Monteschino	Provincia Autonoma Bolzano	EURAC	Soil gas fluxes
	Bacino Idrografico Rio Saldura	Provincia Autonoma Bolzano	EURAC	Soil forming processes
	Rio Saldura	Provincia Autonoma Bolzano	EURAC	
	Area Proglaciale Mazia	Provincia Autonoma Bolzano	EURAC	Soil forming processes

#### **4. IT - LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)**

The LULUCF monitoring system, part of part of National Greenhouse Gas Inventory System in Italy, is aimed to consistently represent national land area, broken down the IPCC categories (i.e. forest land, cropland, grassland, wetlands, settlements, other land) in order to produce accurate estimates of LULUCF emissions by source and removals by sinks. The consistent land representation is achieved on the basis of the National Land-Use Inventory (IUTI) data. Annual data for afforestation/reforestation areas are estimated from the forest area increase as detected by the National Forest Inventories. In addition, for cropland and grassland categories, detailed information on management practices, as included in Rural Development Plans under Common Agriculture Policy (CAP) are used. The same datasets are used for estimate emission projections for LULUCF categories, officially reported under Article 3(2) of the Monitoring Mechanism Decision (Commission Decision 280/2004/EC).

##### **4.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

According the Legislative Decree 51/2008, the Institute for Environmental Protection and Research (ISPRA) is the single entity in charge of the development and compilation of the national greenhouse gas emission inventory; in this framework ISPRA is also responsible for LULUCF monitoring system (i.e. collection and processing of activity data; selection of appropriate emission factors and estimating methodologies; reporting and quality management activities; archiving of the inventory results). ISPRA is also responsible of the National system for policies, measures and emissions projections, and, in cooperation with the Ministry of Environment Land and Sea (MATTM), collects all the information and data from the competent Ministries. The Italian Atmospheric Emission Inventory and the Italian Greenhouse Gas Inventory are compiled and maintained by ISPRA and reported under the United Nations Convention on Climate Change (UNFCCC) and the Convention on Long Range Transboundary Air Pollution (UNECE/CRLTAP).

##### **4.2 Monitoring sites**

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#### **5. Further international monitoring system relevant for soil monitoring in the perimeter of the Alpine Convention**

**IT - ICOS NETWORK (<https://www.icos-cp.eu/>)**

The network of ICOS Ecosystem stations is an instrumentation setup, usually on a tower, that measures the fluxes of greenhouse gases, as well as living and non-living components and drivers responsible for the exchange of greenhouse gases, water and energy between ecosystems and the atmosphere. Ecosystems typically consist of different types of forests, wetlands, croplands, grasslands, agricultural areas, heatlands, lakes or cities. The location of a station represents the local surface where soil, vegetation and environmental conditions differ. It is important to observe greenhouse gases in a variety of ecosystems in order to know how they react in a changing climate.

## **1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Climate Change Unit, Environmental Protection Agency of Aosta Valley

[www.arpa.vda.it](http://www.arpa.vda.it)

## **1.2 Monitoring sites**

IT-Tor

<https://www.icos-italy.it/network/torgnon.pdf>

<http://www.icos-etc.eu/home/site-details?id=IT-Tor>

PI: Edoardo Cremonese

IT-Tor site is located in an unmanaged subalpine grassland in the north-western European Alps (Torgnon, Aosta Valley, Italy) at an elevation of 2160 m asl (45.84444, 7.578055). The site is characterized by an alpine climate with strong seasonality. The mean annual temperature is 3.1 °C and mean annual precipitation is about 880 mm, however, growing season cumulative precipitation can show huge variations (from 160 to 630 mm). On average, the site is covered by a thick snow mantle (90-120 cm) from the end of October to late April or early May, which limits the growing season length to four-five months. Vegetation is mainly composed of matgrass (*Nardus stricta*) with other graminoids and forbs as co-dominant species. The peak value of leaf area index (LAI) is on average 2.2 m<sup>2</sup> m<sup>-2</sup> and the maximum canopy height is 0.2 m. A weather station provides 30-min records of the main meteorological variables (e.g. air and soil temperature, soil water content, soil heat flux, net radiation, photosynthetically active radiation, snow height, precipitation, ...). Turbulent fluxes, sensible, and latent heat are measured using the eddy covariance technique. Precipitation is measured with OTT-Pluvio2 sensor and since 2014 SWE data are collected by Campbell Scientific CS725 sensor. On average monthly (Dec-Apr) snow density data are collected in snow pits.



Soil Protection Working Group

## **Questionnaire on permanent monitoring sites for international monitoring mechanisms**

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**FL**

### **1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)**

Currently, no monitoring sites are determined and no monitoring is carried out.

#### **1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Office of Environment, Gerberweg 5, Postfach 684, LI-9490 Vaduz, info.au@llv.li

#### **1.2 Level I monitoring sites**

Currently, no monitoring sites are determined and no monitoring is carried out.

#### **1.3 Level I monitoring sites**

Currently, no monitoring sites are determined and no monitoring is carried out.

### **2. NEC Directive (National Emission Ceilings Directive)**

Air quality and compliance with threshold values for human health and environmental protection is monitored in cooperation with the monitoring network of the east Swiss cantonal network of east Switzerland 'OSTLUFT'. Threshold immission values for human health and environmental protection and emission limits for energy production, industry, agriculture, traffic, combustion and power fuel, and domestic heating are defined in the national clean air act and further developed in the national air quality action plan.

#### **2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Office of Environment, Gerberweg 5, Postfach 684, LI-9490 Vaduz, info.au@llv.li

## **2.2 Monitoring sites**

Within the OSTLUFT monitoring network there is one permanent online monitoring station for air quality (including NO<sub>x</sub>, O<sub>3</sub>, PM10 and PM2.5) in Vaduz, Liechtenstein. Additional online measurements of PM10 and NO<sub>x</sub> are performed with a mobile station to focus on specific questions and/or hot spots. Passive sampler spread across the country to monitor NO<sub>2</sub>, NH<sub>3</sub> and BTEX (Benzol, Toluol, Ethylbenzol and Xylole). Locations and measurement data are available online: [www.ostluft.li](http://www.ostluft.li).

## **3. LTER Sites (Long-Term Ecosystem Research in Europe)**

The survey of the population and development of plant and animal species in Liechtenstein is currently being conducted within the framework of natural history research in the country. Animal and plant species are surveyed at irregular intervals throughout the country and the results are compared with those from previous surveys. From this, trends can be derived and red lists drawn up. For example, breeding birds were surveyed in 1985 (Volume 5), 2006 (Volume 22) and 2019 (Volume 31). Analogous, repeated surveys exist for fish and crustaceans, amphibians, reptiles, mammals and vascular plants.

In addition to these general and nationwide surveys, specific investigations are also carried out for certain areas such as the "Ruggeller Riet" nature reserve.

### **3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Office of Environment, Gerberweg 5, Postfach 684, LI-9490 Vaduz, [info.au@llv.li](mailto:info.au@llv.li)

<https://www.llv.li/inhalt/112166/amtsstellen/naturkundliche-forschung>

### **3.2 Monitoring sites**

As already mentioned, species monitoring is basically spread across the whole country. However, certain areas, such as nature reserves, are looked at more closely within this monitoring, or there are even specific monitoring programmes for certain species or issues in these areas.

The location of these nature reserves can be found in the public geodata portal:

<https://geodaten.llv.li/geoportal/naturlandschaft.html>

#### **4. LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)**

LULUCF is one sector of the national greenhouse gas inventory and is reported under the UNFCCC and the Kyoto Protocol. There is no LULUCF policy instrument established in Liechtenstein. Spatial planning is still under review.

There is a list of related policies available at:

[https://www.gesetze.li/konso/suche?search\\_text=wald&search\\_loc=titel&lrnr=&lgblid\\_von=&observe\\_date=24.04.2018](https://www.gesetze.li/konso/suche?search_text=wald&search_loc=titel&lrnr=&lgblid_von=&observe_date=24.04.2018)

[https://www.gesetze.li/konso/2009044000?search\\_text=baugesetz&search\\_loc=titel&lrnr=&lgblid\\_von=&observe\\_date=24.04.2018](https://www.gesetze.li/konso/2009044000?search_text=baugesetz&search_loc=titel&lrnr=&lgblid_von=&observe_date=24.04.2018)

[https://www.gesetze.li/konso/suche?search\\_text=bauland&search\\_loc=titel&lrnr=&lgblid\\_von=&observe\\_date=24.04.2018](https://www.gesetze.li/konso/suche?search_text=bauland&search_loc=titel&lrnr=&lgblid_von=&observe_date=24.04.2018)

##### **4.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Office of Construction and Infrastructure

<https://www.llv.li/inhalt/113213/amtstellen/landesrichtplan>

Office of Environment

[www.au.llv.li](http://www.au.llv.li)

##### **4.2 Monitoring sites**

Not applicable.



Soil Protection Working Group

## Questionnaire on permanent monitoring sites for international monitoring mechanisms

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SL

### 1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)

Answered in 1<sup>st</sup> questionnaire

### 2. NEC Directive (National Emission Ceilings Directive)

Answered in 1<sup>st</sup> questionnaire

### 3. LTER Sites (Long-Term Ecosystem Research in Europe)

eLTER RI is a pan-European Research Infrastructure which has been built on the basis of existing national investments over several decades in the context of dedicated networks and ecosystem, critical zone and socio-ecological research projects. LTER Slovenia is a network of eight institutions engaged in a long-term, site-based ecological and socioeconomic research since 2003. LTER Slovenia geographically covers wide spectrum of monitoring sites, from which are two cave systems, 11 forest platforms, two lakes and one marine site. Depending on the physical characteristics of the LTER site, several ecological and biodiversity data are measured. Parameters are monitored in the air, water, soil, and vegetation. All of them for a separate site can be found on the official data base web address:

[https://deims.org/search/sites?field\\_country\\_value%5B%5D=SI](https://deims.org/search/sites?field_country_value%5B%5D=SI)

#### 3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

Members of LTER Slovenian Consortium are:

- **Research Centre of the Slovenian Academy of Sciences and Arts** (national coordinator and headquarter): <https://www.zrc-sazu.si>
- **National Institute of Biology – Marine Biology Station Piran**: <https://www.nib.si>



- **Slovenian Forestry Institute:** <http://en.gozdis.si>
- **University of Ljubljana – Biotechnical Faculty:** <https://www.uni-lj.si>
- **University of Nova Gorica:** <http://www.ung.si>
- **Škocjan Caves Park Public Service Agency, Slovenia:** <https://www.park-skocjanske-jame.si>
- **Slovenian Museum of Natural History:** <https://www.pms-lj.si>
- **Society for Cave Biology - Tular Cave Laboratory:** <https://www.tular.si>

### 3.2 Monitoring sites

Monitoring sites ([https://deims.org/search/sites?field\\_country\\_value%5B%5D=SI](https://deims.org/search/sites?field_country_value%5B%5D=SI)) are:

Borovec

Brdo

Cerknica Lake

**Fondek** (in the perimeter of the Alpine Convention)

Gameljne

Gropajski bori

Gulf of Trieste

Krakovski gozd

**Lake Bohinj** (in the perimeter of the Alpine Convention)

Lontovž

Murska šuma

Podgorski Kras

**Pokljuka** (in the perimeter of the Alpine Convention)

Postojna-Planina Cave System

Škocjan Caves

**Tratice** (in the perimeter of the Alpine Convention)

Soil Protection Working Group

## **Questionnaire on permanent monitoring sites for international monitoring mechanisms**

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**CH**

### **1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)**

#### **Long-term Forest Ecosystem Research (LWF)**

The Long-term Forest Ecosystem Research (LWF) follows multiple objectives by gathering data through 19 monitoring sites that are scattered across Switzerland. Its objectives are:

- Early detection and a representative assessment of changes in forest condition
- Determination of external influences, both from anthropogenic and natural sources and their effect on the forest ecosystem (element inputs, climate)
- Determination of changes in important components within the forest ecosystem
- Development of indicators to assess the condition of the forest
- Integrated risk assessment based on different stress scenarios
- Extended platform for internal and external research projects

The monitoring sites are all part of the ICP Forests Network.

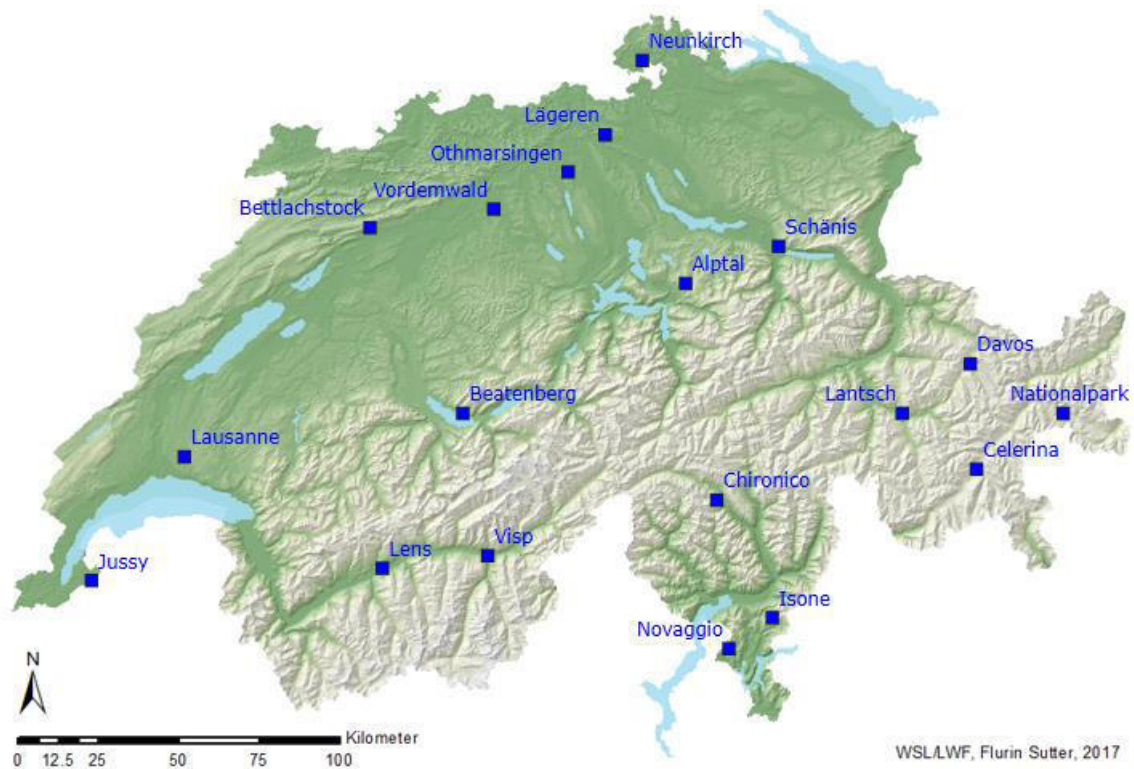
#### **1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

The LWF-Programme is run and financed by the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) (<https://www.wsl.ch/en/index.html>).

#### **1.2 Level I monitoring sites**

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#### **1.3 Level II monitoring sites**



There are 19 Long-term Forest Ecosystem Research (LWF) sites, which are part of the ICP Forests Network. The LWF Sites within the AC-perimeter are:

- Beatenberg
- Alptal
- Schänis
- Lens
- Visp
- Chironico
- Lantsch
- Davos
- Novaggio
- Isonne
- Nationalpark
- Celerina

## 2. NEC Directive (National Emission Ceilings Directive)

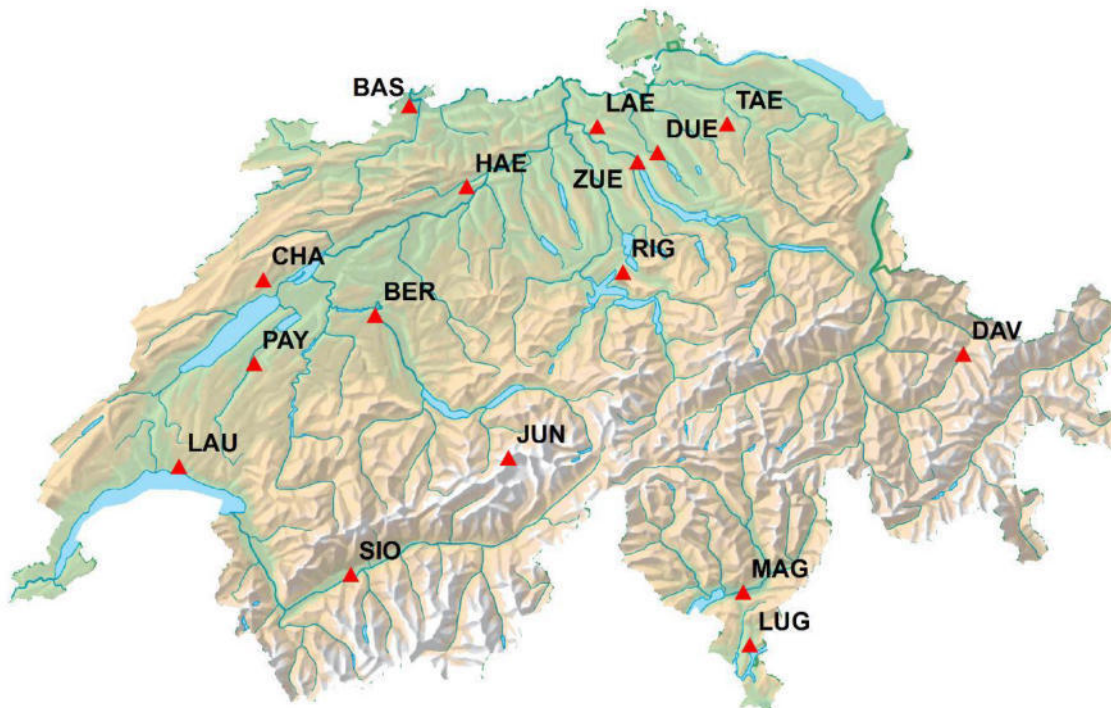
Switzerland has set a target similar to the target of the NEC Directive. It aims to reduce the VOC-emissions by 30% until 2030, taking the year 2005 as the starting point.

### 2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

Federal Office for the Environment FOEN, Section Air Pollution Control and Chemicals Division (<https://www.bafu.admin.ch/bafu/en/home/office/divisions-sections/air-pollution-control-and-chemicals-division.html>)

## 2.2 Monitoring sites

There are 16 monitoring sites in Switzerland which measure air pollution. These are part of the National Air Pollution Monitoring Network (NABEL). The Monitoring Sites within the AC-perimeter are: Sion-Aéroport (SIO); Magadino-Cadenazzo (MAG); Davos-Seehornwald (DAV); Rigi-Seebodenalp (RIG); Jungfraujoch (JUN).



## 3. LTER Sites (Long-Term Ecosystem Research in Europe)

The same 19 LWF sites mentioned above in the ICP Forests program are part of the LTER-Europe network.

Continuous measurements of environmental factors and observation of forest condition on long-term research plots, allow the evaluation and meaningful conclusions on possible causes of changes and future scenarios. Measurements are based on international standard methods and quality control as set down in the manuals of ICP Forests and ICOS.

### 3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

The LWF-Programme is run and financed by the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) (<https://www.wsl.ch/en/index.html>).

### **3.2 Monitoring sites**

The 19 monitoring sites, which are part of the ICP Forests Network, are as well part of the LTER-Europe Network.

## **4. LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)**

As a third country, Switzerland is not directly involved in the implementation of the Regulation. Switzerland did however agree to a further commitment period under the Kyoto Protocol. Under the Paris Agreement on Climate Change, Switzerland has undertaken to halve its greenhouse gas emissions by 2030 compared with 1990 levels.

In accordance with the requirement of the Paris Agreement to submit a long-term climate strategy until the end of 2020, the Federal Office for the Environment (FOEN) is currently developing a strategy, which aims to reduce the net carbon emissions to net zero by 2050.

### **4.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Federal Office for the Environment (FOEN)  
(<https://www.bafu.admin.ch/bafu/en/home.html>)

### **4.2 Monitoring sites**

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Soil Protection Working Group

## Questionnaire on permanent monitoring sites for international monitoring mechanisms

Please send your feedback **by FR, 27 March 2020** to [vera.bornemann@alpconv.org](mailto:vera.bornemann@alpconv.org) to allow us to prepare an overview of the results for the 3<sup>rd</sup> meeting of the working group.

Please delete this instruction text and the other instructions in the document. Just keep the answers.

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### Country Prefix

Please replace the heading 'country prefix – name of the monitoring scheme' with the standard country prefix (e.g. DE, AT)

### 1. ICP Forest Programme (International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests)

Briefly summarize the main content of the monitoring scheme (its aim and scope, links to policy objectives and other policy instruments, which parameters it focuses on, other key information you think is relevant to understand the monitoring scheme)

Please KEEP to around 150 words.

#### 1.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument

Which institutions are responsible for the implementation and/or evaluation of the monitoring scheme? Please include the names and link to their home pages, and delete the instructions text.

#### 1.2 Level I monitoring sites

Please list here the monitoring sites, which are in the perimeter of the Alpine Convention. List the locations, site characteristics and other relevant information as exact as possible in writing. Please include cartographic overview(s), if available.

### **1.3 Level I monitoring sites**

Please list here the monitoring sites, which are in the perimeter of the Alpine Convention. List the locations, site characteristics and other relevant information as exact as possible in writing. Please include cartographic overview(s), if available.

## **2. NEC Directive (National Emission Ceilings Directive)**

Briefly summarize the main content of the monitoring scheme (its aim and scope, links to policy objectives and other policy instruments, which parameters it focuses on, other key information you think is relevant to understand the monitoring scheme)

Please KEEP to around 150 words.

### **2.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Which institutions are responsible for the implementation and/or evaluation of the monitoring scheme? Please include the names and link to their home pages, and delete the instructions text.

### **2.2 Monitoring sites**

Please list here the monitoring sites, which are in the perimeter of the Alpine Convention. List the locations, site characteristics and other relevant information as exact as possible in writing. Please include cartographic overview(s), if available.

## **3. LTER Sites (Long-Term Ecosystem Research in Europe)**

Briefly summarize the main content of the monitoring scheme (its aim and scope, links to policy objectives and other policy instruments, which parameters it focuses on, other key information you think is relevant to understand the monitoring scheme)

Please KEEP to around 150 words.

### **3.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Which institutions are responsible for the implementation and/or evaluation of the monitoring scheme? Please include the names and link to their home pages, and delete the instructions text.

### **3.2 Monitoring sites**

Please list here the monitoring sites, which are in the perimeter of the Alpine Convention. List the locations, site characteristics and other relevant information as exact as possible in writing. Please include cartographic overview(s), if available.

## **4. LULUCF (Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry)**

Briefly summarize the main content of the monitoring scheme (its aim and scope, links to policy objectives and other policy instruments, which parameters it focuses on, other key information you think is relevant to understand the monitoring scheme)

Please KEEP to around 150 words.

### **4.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Which institutions are responsible for the implementation and/or evaluation of the monitoring scheme? Please include the names and link to their home pages, and delete the instructions text.

### **4.2 Monitoring sites**

Please list here the monitoring sites, which are in the perimeter of the Alpine Convention. List the locations, site characteristics and other relevant information as exact as possible in writing. Please include cartographic overview(s), if available.



## **5. Further international monitoring system relevant for soil monitoring in the perimeter of the Alpine Convention**

*Please copy this section (5. – 5.2) as many times as need to fill in additional international monitoring system relevant for soil monitoring in the perimeter of the Alpine Convention!*

Briefly summarize the main content of the monitoring scheme (its aim and scope, links to policy objectives and other policy instruments, which parameters it focuses on, other key information you think is relevant to understand the monitoring scheme)

Please KEEP to around 150 words.

### **5.1 Institution(s) responsible for the implementation and/or evaluation of the policy instrument**

Which institutions are responsible for the implementation and/or evaluation of the monitoring scheme? Please include the names and link to their home pages, and delete the instructions text.

### **5.2 Monitoring sites**

Please list here the monitoring sites, which are in the perimeter of the Alpine Convention. List the locations, site characteristics and other relevant information as exact as possible in writing. Please include cartographic overview(s), if available.