

# Criterion 5: Maintenance and Appropriate Enhancement of Protective Functions in Forest Management (Notably Soil and Water)

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Data sources: **National reports on the pan-European indicators for SFM (5.1, C.1)**

*Forests are important for preventing soil erosion, protecting water resources, and maintaining other protective functions. Forests also play a vital role in the protection of infrastructure or inhabited areas from natural hazards such as avalanches, rockfalls, noise, dust, heat, and wind. Countries apply specific policies and measures to maintain and improve the above-mentioned protective functions, often within a framework of multifunctional forest management.*

## Key messages

- About 32% of the forest area is designated for soil, water, and other ecosystem function protection in 25 reporting countries.
- Forests designated for the protection of infrastructure and managed natural resources are reported for about 2% of Europe's forest area.
- Protective functions are often integrated into multifunctional forestry.
- Policy achievements comprise an increasing area of designated protective forests, restoration and afforestation activities, as well as the implementation of relevant legislation, strategies, and action plans to secure protective functions. The challenges faced in achieving policy objectives related to the maintenance and enhancement of protective functions of forests include reduced funding and staff, effects of air pollution, and ageing of designated protective forests.

## Indicator 5.1 Protective forests - soil, water and other ecosystem functions - infrastructure and managed natural resources

Area of forest and other wooded land designated to prevent soil erosion, preserve water resources, maintain other protective functions, protect infrastructure and managed natural resources against natural hazards

### Key findings

- There is a strong support to the concept of forests designated for protection of soil, water and other ecosystem functions amongst about 40% of European countries. Area of these forests is increasing since 1990. However, protective functions are often integrated into multifunctional forestry.
- Forests designated for the protection of infrastructure and managed natural resources are reported for about 2% of Europe's forest area while on forest and other wooded land it amounts to 2.6%. Most of the designated forest stands are located in mountainous areas.

### Introduction

Forests are important for preventing soil erosion, protecting water supplies and maintaining other specific ecosystem functions. Countries apply specific policies and measures to support forests in order to recognise and safeguard these functions. Such measures include the identification of forests to be designated primarily for protective purposes, and

the restriction or adaptation of certain management practices to enhance protective functions. Designations of protective forests are administrative in nature or the result of decisions made in the context of land-use and forest management planning and result in specific obligations related to practical management.

Forests also play a vital role in the protection of infrastructure or inhabited areas. Natural hazards such as avalanches or rockfalls are common in mountainous areas. Protective forests can be an efficient means for providing protection against such hazards in those areas. To maintain or even increase these protective functions, specific forest management schemes were developed which often differ considerably from non-protective forests.

### Status

#### Protective forests - soil, water and other ecosystem functions

25 countries provided information on protective forests in 2020, specifically in relation to the prevention of soil erosion, preservation of water resources and maintenance of other ecosystem functions. 23 countries declared designated areas for these protective purposes. European countries reported a total of over 376 million ha (in EU-28 21.7 million ha), or just over 32.1% of the forest area in those countries (Table 5.1-1).

**Table 5.1-1: Forest area designated for the protection of soil, water and other ecosystem functions, by region, 2020**

Region	Protective forests - soil, water and other ecosystem functions	
	1 000 ha	% of forest area
North Europe	506	5.8
Central-West Europe	907	9.6
Central-East Europe	13 727	30.7
South-West Europe	13 018	46.3
South-East Europe	9 453	36.0
EU-28	21 684	30.5
Europe	37 610	32.1

Note: Data coverage as % of total regional forest area: NE 12%, C-WE 24%, C-EE 100%, S-WE 89%, S-EE 64%, EU-28 44%, Europe 52%.

The reported share of protective forests for soil and water and other ecosystem functions ranged from 0 to 100% in individual countries. 24% (11 countries) of European countries reported that over 20% of their forests are considered protective while 9% (four

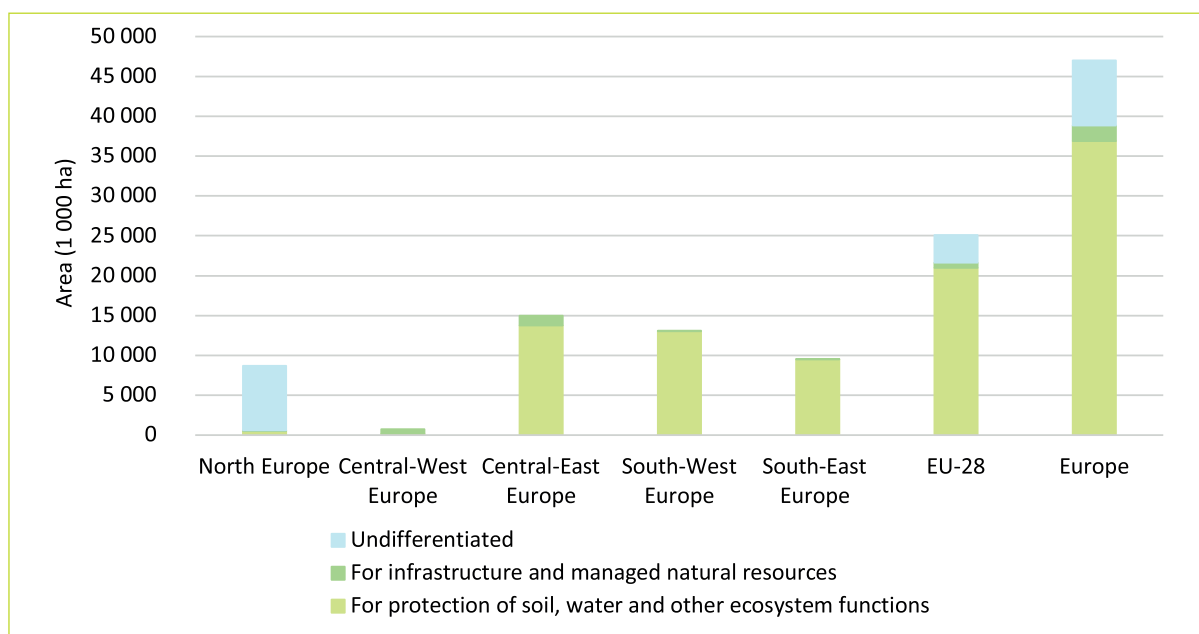
countries) indicated a share exceeding 40%. The share of protective forest area is highest in Georgia (100%), followed by Italy (87%) and the Republic of Moldova (57%). The largest area of protective forests was reported in Central-East Europe (Table 5.1-1), while

the least was reported in North Europe, reflecting also different prevailing terrain conditions. However, this is because most countries in Northern Europe do not distinguish between forest designated for the protection of soil, water and ecosystem functions and those primarily designated for the protection of infrastructure and managed natural resources, reporting a single undifferentiated statistic (Figure 5.1-1). If this undifferentiated area is taken into account, Central-West Europe is the region with the smallest reported area of designated protective forest. However, for this comparison, data were provided by countries representing only 14% of the forest area of this region.

Explanatory information provided by the countries suggests that several are reluctant to define a proportion of national forest area as specifically designated for environmental protection, possibly because this could imply that the remaining areas fail to provide the associated services. The guidelines for data providers require a legal basis or designated management plans that ensure a long-term commitment to protective functions for soil and water and other ecosystem functions, but these

are often implemented in conjunction with other functions (e.g. production, recreation). In general, however, only about half the countries provided explanatory information for the 2020 assessment so it is not possible to identify criteria used for their designation with confidence. Identification of such protective forests seems to be largely based on surveys (e.g. mapping of forest functions/services), physical characteristics (e.g. slope, or soil susceptibility to erosion) or designations of some kind, some defined in legislation. Information for assessing their area is often based on analysis of management plans or national forest inventory information, with extrapolation implicated across monitoring periods.

Some countries commented that, while forests fulfil protective functions, their primary aim is “multiple uses”, hence they do not qualify for reporting. Another identified that because the soil and/or water protection is a declared basic function of the country's forests, all should be included in the area reported. This highlights the fact that there is considerable disparity in interpretation and that national forestry policy, legislation and data assessment procedures all play a part in reporting on this indicator.



**Figure 5.1-1: Area of protective forests, by region, 2020**

Note: Data coverage as % of total regional forest area: NE 100%, C-WE 14%, C-EE 100%, S-WE 89%, S-EE 64% EU-28 72%, Europe 77%.

### Protective forests – infrastructure and managed natural resources

Data provided on protective forests for infrastructure and managed natural resources are rather fragmentary. On the one hand, few countries stated that the data available does not allow for clear separation

from the soil, water and other ecosystem functions. On the other hand, data are sometimes not available for allocation of forest areas with confidence. The above-mentioned difficulties led to the situation that

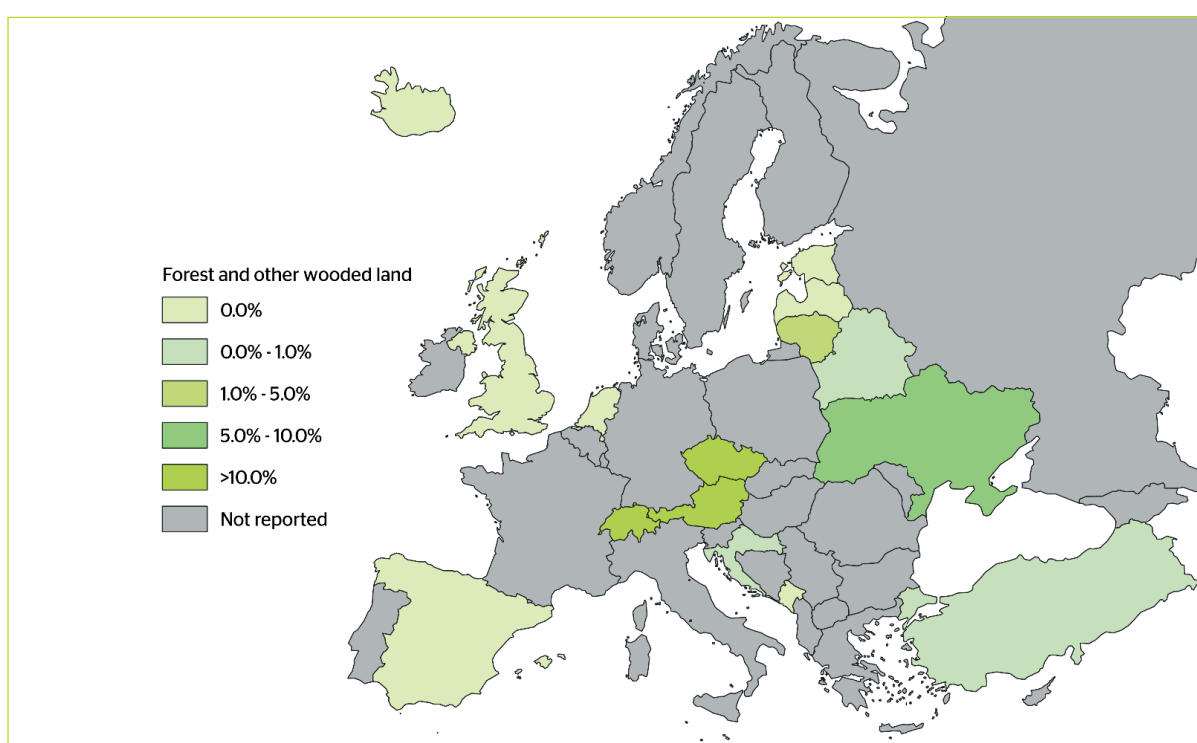
only 20 countries reported figures on the forest in this category for 2020. Out of those 20 countries, 12 reported that they have designated protective forests for infrastructure and managed natural resources. The remaining stated that there are no such forests in their countries. When considering both forest and other wooded land (FOWL), data coverage does not change notably for Europe, nor for most regions. It does, however, increase considerably for Central-West Europe. The increase can be explained, as Austria reports only for FOWL but not for forest individually. Based on available data, about 2% of Europe's forests have been designated as having protective functions for infrastructure and managed natural resources. In Central-West Europe, the share of the respective

forest area is 9.9%, visibly higher and certainly influenced by the large share of such protective forest in Switzerland. When looking at FOWL in Europe about 2.6% is allocated to protective forests for infrastructure and managed natural resources (Table 5.1-2). Through the inclusion of the Austrian data, the share of reported FOWL area increases by 5% in Central-West Europe up to 14.8%, which is about three-fold higher than in any other European region. Most of Europe's FOWL area designated for the protection of infrastructure and managed natural resources is reported by just three countries alone. Switzerland (41.2%) is the country with the highest share, followed by Austria (19.2%), and the Czech Republic (10.7%) (Figure 5.1-2).

**Table 5.1-2: Forest and other wooded land (FOWL) area designated for the protection of infrastructure and managed natural resources, by region, 2020**

Region	Protective FOWL - infrastructure and managed natural resources	
	1 000 ha	% of FOWL area
North Europe	82	1.0
Central-West Europe	1 326	14.8
Central-East Europe	1 043	4.8
South-West Europe	0	0.0
South-East Europe	22	0.1
EU-28	1 141	2.3
Europe	2 474	2.6

Note: Data coverage as % of total regional FOWL area: NE 11%, C-WE 22%, C-EE 48%, S-WE 63%, S-EE 56%, EU-28 27%, Europe 37%.



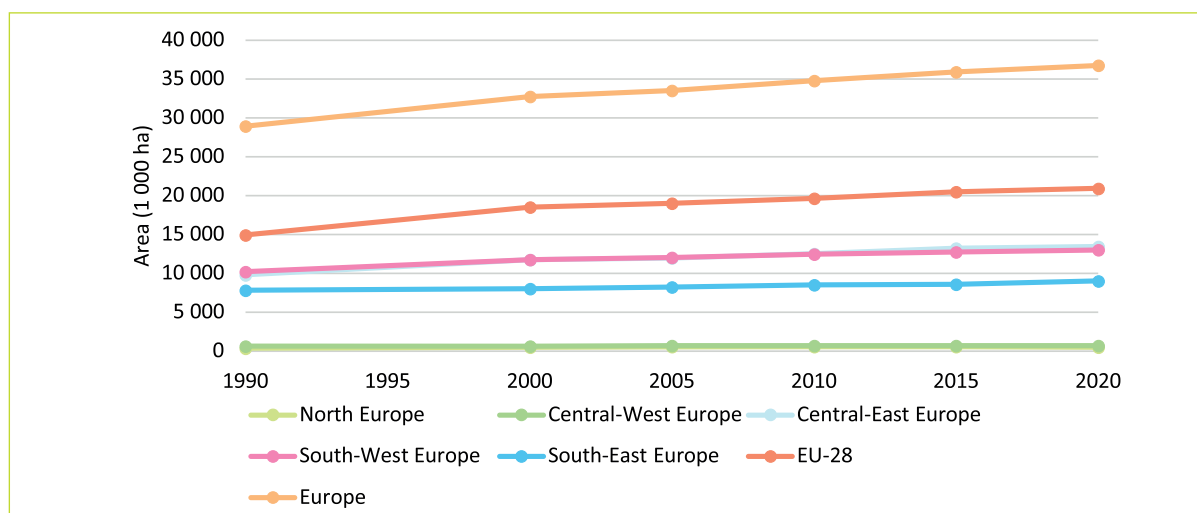
**Figure 5.1-2: Share of FOWL area for the protection of infrastructure and managed natural resources, by country, 2020**

## Trends

### Protective forests – soil, water and other ecosystem functions

Only 23 countries, providing series from 1990 to 2020, are included in the analysis of trends. Figure 5.1-3 shows that, in general, the area of forest managed for the protection of soil, water and other ecosystem functions has been increasing since 1990. This

indicates that designation of forests for protection of soil, water and ecosystem functions is on an increase. However, the relevance of protective functions differs among countries and is often determined by terrain and soil conditions in forests.



**Figure 5.1-3: Trends in the area of protective forests for soil, water and other ecosystem functions, by region, 1990-2020**

Note: The trend lines for C-EE and S-WE overlap.

Data coverage as % of total regional forest area NE 12%, C-WE 18%, C-EE 94%, S-WE 89%, S-EE 59%, EU-28 41%, Europe 48%.

### Protective forests – infrastructure and managed natural resources

The interpretation of trends has to be approached with caution, as data availability is very limited. To increase the data coverage, the period considered for trends was shortened to 2000-2020 and focused on FOWL. The trends in Table 5.1-3 rely on data from 13 countries, five of these indicating zero area of protective FOWL. The European protective FOWL

steadily increased over the last 20 years, while the reported increase from 2015 to 2020 was higher than in previous reporting periods. The large increase in protective FOWL can be attributed to Austria (Central-West Europe), where reported designated area doubled in 2020. Apart from Central-West Europe, no larger changes are reported in the other regions.

**Table 5.1-3: Trends in the area of FOWL designated for the protection of infrastructure and managed natural resources, by region, 2000-2020**

Region	Protective FOWL area				
	2000	2005	2010	2015	2020
	1 000 ha				
North Europe	71	74	76	78	82
Central-West Europe	718	834	932	939	1 326
Central-East Europe	952	1 057	1 003	1 021	1 043
South-West Europe	0	0	0	0	0
South-East Europe	21	21	21	22	22
EU-28	414	602	730	749	1 141
Europe	1 761	1 987	2 032	2 060	2 474

Note: Data coverage as % of total regional FOWL area: NE 11%, C-WE 21%, C-EE 48%, S-WE 63%, S-EE 54%, EU-28 27%, Europe 36%.

## **Indicator C.5: Policies, institutions and instruments to maintain and appropriately enhance the protective functions in forest management**

### **Key findings**

Most of the reporting countries have **policy objectives** on the maintenance and appropriate enhancement of the protective functions in forest management. A few **quantitative targets** reported for the policy objectives focus mainly on qualitative improvement of the protective functions of forests designated for protecting soil, water, other ecosystem functions, infrastructure and managed natural resources against natural hazards. **Institutional measures** taken to achieve the objectives comprise primarily relevant collaboration and coordination with all concerned stakeholders and the implementation of specified management necessities. Legal, financial and communication **policy tools** include the designations by legal acts, safeguarding financial resources specifically for managing protective forests and information activities. **Achievements** over the past five years comprise increasing designations of protective forest areas, restoration and afforestation activities and the implementation of relevant legislation, strategies and action plan to secure the protective functions. The major **challenges** and **obstacles** to achieving the policy objectives are mainly in reduced funding and staff to enhance the functionality of protective forests, pollutants originating from other sectors as well as ageing of forests which cannot sufficiently fulfil appropriate protective functions.

### **Most of the reporting countries have policy objectives related to the maintenance and appropriate enhancement of the protective functions in forest management.**

The majority of reporting countries (26 of 30) have informed about national policy objectives with regard to Criterion 5. The maintenance and enhancement or improvement of forest protective functions is a major goal of forest policy in 15 countries from all over Europe. Nine countries have particular policy objectives on the protection of water resources - drinking water, strengthening of water storage and retention functions or for the tree vitality in the context of water protective functions. Seven countries mentioned additionally soil protection aspects as the main policy objective, with particular attention being paid to the mitigation and prevention

of soil erosion, desertification, physical impacts and to the maintenance of filtration capacities. A few countries also highlighted the importance of forests in mountainous areas for the protection of human life and infrastructure (settlements, railways, roads etc.). Further policy objectives focus on the role of afforestation on unstocked, protective forest areas and on improved particular management to enhance and maintain the protective functions of those forests.

### **A few quantitative targets reported for the policy objectives focus mainly on qualitative improvement of the protective functions.**

References to the following quantitative targets were reported by three countries (see Table C.5-1).

### **Institutional measures taken to achieve these objectives comprise primarily relevant collaboration and coordination with all stakeholders and the implementation of specified management necessities.**

Institutional measures taken to achieve the policy objectives were reported by 22 countries. Five countries reported focusing on respective collaboration and coordination with other sectors, related departments and local municipalities to maintain and enhance the protective functions.

Six countries reported on the implementation of specified management necessities, including restrictions for clear-cutting systems in the protective forests. The following institutional measures were mentioned by a few countries only:

- creation of framework conditions for the sustainable provision of the qualitatively and quantitatively adequate water supply from protective forest areas,
- strengthening of risk governance approaches and their implementation in protective forests,
- pre-emption rights of state and municipalities in trading with protective forests,
- elaboration of criteria for protective forest designation,
- monitoring of protective forest areas.



**Table C.5-1: Country-specific targets on the maintenance and appropriate enhancement of the protective functions in forest management**

Country	Target	Specification
Austria	Raising the share of protective forest areas where no measures for improvement are needed	from 41% to 45% until 2020
Austria	Reducing the percentage of protective forest areas where measures for improvement are urgently needed	from 24% to 20% by 2020
Austria	The utilisation of the subsidies available for protective forest management	100%
Poland	Increasing the volume of retained water in forests in lowland areas	up to 2.1 mil m <sup>3</sup>
Poland	Increasing the volume of retained water in forests in mountainous areas	up to 0.4 mil m <sup>3</sup>
Switzerland	Reduction in the area of critical protective forests	25% by 2040
Switzerland	Improvement of the protective function	3% of the total protective forest area annually

**Legal, financial and communication policy tools were applied by 24 countries to reach the objectives. They include the designations by legal acts, safeguarding financial resources specifically for managing protective forests and multiple information activities.**

**Legal:** In 13 countries from all regions, protective functions of forests are properly designated by legal documents, most often Forest Acts, but for instance also in Flood Risk Management Acts.

**Financial:** Safeguarded public financial resources for the management of protective forests and the improvement of their protective functions were reported by nine countries. Subsidies for private forest owners for relevant management activities were reported by two countries. Rural development programme funds for management activities in protective forests were reported by four South European countries. In a Central-East European country, protective forests are not subject to property tax.

**Communication:** Information activities highlighting protective forest management requirements or its importance for the maintenance of soil and water protective functions were reported by eight countries. They comprise workshops and conferences on protective forests, information platforms, cooperation with local municipalities, communication of scientific research and awareness-raising of society and target

audiences outside of the forest sector regarding the importance of forest management in protective forests to maintain their protective functions.

**Achievements over the past five years comprise increasing designations of protective forest areas, restoration and afforestation activities and the implementation of relevant legislation, strategies and action plans to secure the protective functions.**

18 countries reported on achievements to maintain and appropriately enhance the protective functions in forest management. This includes that the designated area of protective forests has been increasing in the past five years in four Eastern European countries. Successful forest restoration and re-establishment of stands on degraded protective forest areas was reported by four countries. Implementation of relevant EU legislation, national strategies and action plan to secure protective functions was particularly reported by five countries.

**The major challenges and obstacles to achieving the policy objectives include mainly on reduced funding and staff to enhance the functionality of protective forest, reduction of pollution originating in other sectors as well as ageing forest stocks which cannot sufficiently fulfil appropriate protective functions.**



Challenges and obstacles in the area of Criterion 5 were reported by 22 countries. They comprise the following topics ranked according to the occurrence in the national reports:

- enhancement of the functionality of protective forests as an efficient and low-cost method to protect soil, groundwater and settlement areas and infrastructure while facing at the same time reducing resource availability in terms of funding and staff,
  - nitrogen and other depositions from other sectors contaminating forest soils and groundwater reservoirs,
  - the ageing of forests, coupled with the lack of sufficient natural regeneration, the lack of uneven-aged stand structure, reduced stability and vitality of the trees and the high maintenance and harvest costs in mountain forests,
- lack of supportive scientific evidence,
  - insufficient communication with public, media and politicians,
  - increased soil degradation due to global warming and climate change,
  - due to extreme site conditions, high shares of protective forests are not suitable for timber supply,
  - adjustment of game management to the requirements of protection efficiency,
  - long-term negative effects after events as avalanches and mudslides.